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ABSTRACT

Designed to present the history and state-of-the-art of the moped (motorized bicycle) in Ohio and in the other states, to analyze the issues that have arisen regarding the moped and its impact on traffic safety, and to offer suggestions for future action, this report begins with a description of the current moped situation. The second section presents the history of the moped in Europe and the U.S. including an overview of the history of Ohio's moped legislation, moped accident data, and current research projects on mopeds. Section 3 analyzes current moped legislation in each of the fifty states. Three reasons for the popularity of the moped are discussed in the fourth section. Focusing on safety, the fifth section describes safety considerations related to the operator, the vehicle construction, and the environment. In addition, this section gives twenty-five safety tips for moped operators. The appendixes contain federal motor vehicle safety standards relating to the moped; Ohio's rules for motorized bicycle equipment, testing, and qualifications; an overview of current moped legislation in Canada; and a course outline for moped safety. (LRA)

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THE moped REPORT

ED176089

Ohio Department of Education

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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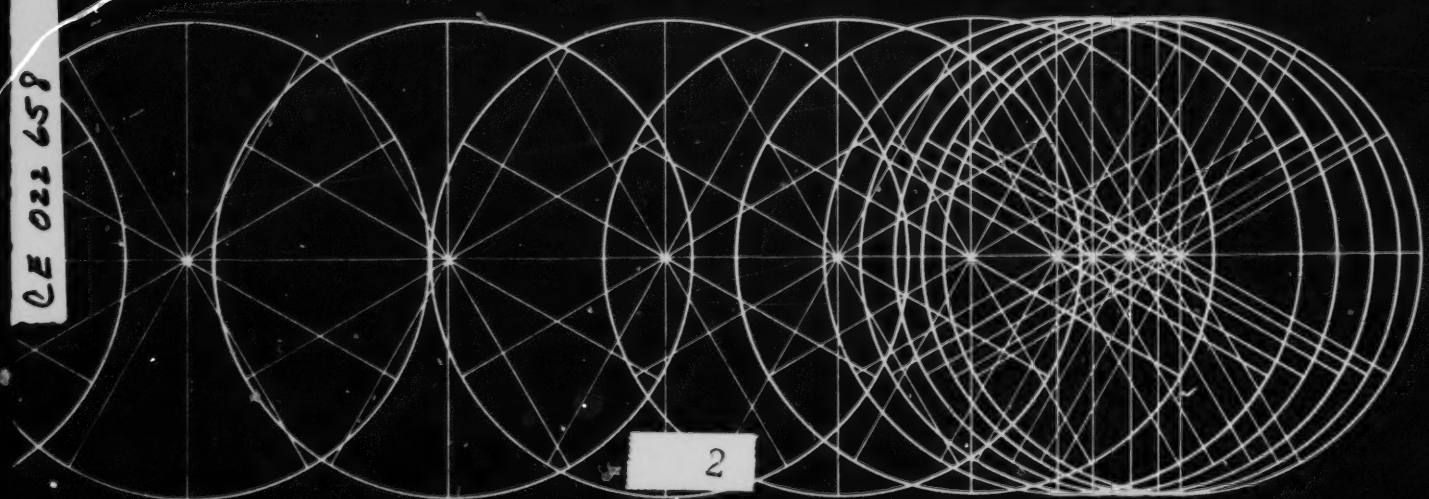

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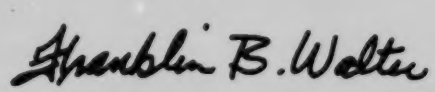
Foreword

The State Board of Education recognizes that driver and traffic safety education professionals need to keep current with situations and issues that have potentially significant impact on traffic safety. The Ohio Department of Education, Division of School Finance, Driver Education Section, in addition to administering a state subsidy for all approved driver education programs meeting minimum standards, has the opportunity of using National Highway Traffic Safety Administration funds to intensify the effectiveness of the traffic safety education effort. Within this activity, areas are periodically identified that call for study and the generation of a technical report — an objective and thorough analysis of an issue, situation, problem, or controversy that affects traffic safety education.

In the last several years a new vehicle, the moped, has become the focus of not only a great wave of popularity but also a good deal of controversy. Much has been said about its potential impact on transportation, the economy, and the environment, and its safety continues to be debated. The Driver Education Section has identified this complex issue as a topic in need of study and analysis. This report represents the outcome of that analysis.

The purposes of this report are to present the history and "state of the art" of the moped in Ohio and in the other states, to analyze the issues that have arisen regarding the moped and its impact on traffic safety, and to offer suggestions for future action. It is hoped that this report contributes to and helps clarify the existing body of information about the moped.



Franklin B. Walter
Superintendent of
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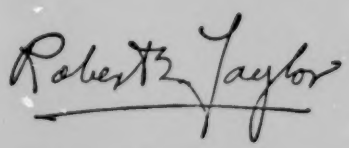
Preface

The Ohio Traffic Safety Education Center (OTSEC), a project of The National Center for Research in Vocational Education at The Ohio State University, is funded by the Ohio Department of Transportation and monitored by the Ohio Department of Education, Division of School Finance, Driver Education Section. OTSEC was organized to provide assistance to the citizens and state departments of Ohio in five basic functional areas: research, development, service, education, and dissemination. These areas to a large extent parallel the functional areas of the National Center.

Within the five areas, driver and traffic safety education projects at OTSEC have been broad in scope. They have included such activities as developing driver education curricula for use in public schools, publishing a traffic safety newsletter for distribution throughout the state, developing a driver education information package for local school boards, organizing and operating a driver and traffic safety information center, conducting workshops in motorcycle safety and driver education for the handicapped, and many others.

The outcome of OTSEC's research, development, and education programs has been heightened awareness of driver and traffic safety practices on the part of Ohio's citizens. By furthering this awareness, OTSEC has made and will continue to make a positive impact on traffic safety in Ohio.



Robert E. Taylor
Executive Director
The National Center for
Research in Vocational Education

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"Ohio stands out as one of the country's major crossroads of transportation and communication. This geographical position affords this population center a significant opportunity to coordinate our network of highways and people."

Herbert D. Brum, Director
Division of School Finance
Ohio Department of Education

From idea to reality . . .

In 1976, Ohio was one of six states to receive an incentive grant from the National Highway Traffic Safety Administration. Channeled through the Ohio Department of Transportation, a $212,000 grant was awarded to the Ohio Department of Education to bring an idea into reality — to establish a traffic safety education center.

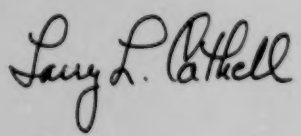
The center has been instituted by the Ohio Department of Education at The Ohio State University under the auspices of The National Center for Research in Vocational Education. One of the major tasks of the Ohio Traffic Safety Education Center has been to assist in the development of this technical research effort.

Overview

The Moped Report originated as a technical research paper to determine the state of the art in this rapidly growing dimension of the traffic safety environment. Emerging concerns surrounding the use of mopeds by our children prompted the need for a comprehensive research effort.

Driver education curricula in Ohio schools provide an avenue for teaching sound safety education principles to our youth. The information offered in this comprehensive research effort makes the report an invaluable supplement to current curricula.

We are pleased to provide this technical research report in an effort to expand driver and traffic safety education principles to include the moped user. We trust that the knowledge to be gained from this report can be successfully transmitted to our students, making them safe, sensible moped operators.



Larry L. Cathell
Chief, Driver Education Section

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Moped, or Motorized Bicycle.

Pictured here is the most common moped design, which has the engine built into the lower center structure of the vehicle. Other models have the engine over the front or rear wheel. Add-on engines can also be purchased and installed on a regular bicycle.

The Moped Situation

In the last three years a new vehicle has taken its place in the mainstream of American transportation: the motorized bicycle, or moped. This small, relatively low-powered, two- or three-wheeled[1] vehicle has characteristics of both the bicycle and the motorcycle. Like the bicycle, it can be mounted, pedaled, and stopped with handbrakes. Like the motorcycle, it can be propelled by a motor which is regulated by a hand throttle. Beyond these similarities, however, the moped is relatively unique. It is shorter in height (about 20 inches), heavier (60 to 100 pounds), more expensive ($300 to $625), and more difficult to pedal than an ordinary adult 10-speed bicycle. It is simpler, smaller, lighter, and less expensive than a motorcycle and lacks the motorcycle's kick starter, manual clutch, footbrake, and turn signals.

Typically, the motor is a small, two-stroke piston single-cylinder engine (smaller than that of a power lawn mower), which is air or water cooled and requires a mixture of gasoline and oil. Lighting and ignition are provided by a magneto flywheel turned by the engine.

Mopeds are pedaled to build momentum before the motor is engaged. Once operating, the motor will propel the vehicle at top speeds ranging from 17 to 30 m.p.h. on level ground (top speeds vary among models and are regulated by state laws). Many moped models also need a pedaling assist on uphill grades. When stopped, the transmission shifts into neutral until the throttle is twisted again.

The specifications of the moped are compared with those of other two-wheeled vehicles in Figure 1.

Much has been said and written about the moped as its numbers have grown — about what it is and isn't (a bicycle, motorcycle, or neither); about how its use should or shouldn't be legislated; about whether it is a boon to transportation, the economy, and the environment or a growing safety hazard or both; and about what we can expect in the near and far future with regard to market growth, legislative constraints, research directions, impact on traffic situations, and driver education. Opinions, studies, and mandates have come from professionals in traffic safety and other fields, government officials, legislators, consumer groups, and private industry, through such diverse media as professional journals in traffic safety, general and special interest periodicals, presentations to groups of people, newspapers, government documents, student theses, published handbooks, advertising, and the law. Few issues or products related to traffic safety have commanded so much concentrated attention in so wide an arena. But why is there so much controversy over so simple a machine?

Popularity vs. Safety

In the most general terms, the controversy surrounding the moped boils down to popularity versus safety. There is no doubt that the moped is popular among the people in the United States and elsewhere. As will be explored more fully later in this report, the market for mopeds in America has mushroomed since the vehicle was introduced

[1] A newer, four-wheeled moped has recently been marketed.

Figure 1

Comparative Specifications of Two-Wheeled Vehicles

	Bicycle	Moped	Motor-Driven Cycle	Motorcycle
Horsepower	none	1 to 2	up to 5	over 5 (up to 50 or more)
Speed	up to 30	18 to 28	up to 50	up to 120 or more
Engine Displacement	none	50 cc	up to 150 cc	70 to 1200 cc
Weight	25-35	60 to 100 lbs.	150 to 300 lbs.	300 to 700
Transmission	none	automatic	manual	manual or automatic
Brakes	hand or foot operated	hand operated	foot and hand operated	foot and hand operated

here by European manufacturers. Consumer demand for the moped is high among diverse groups — young, mid-life, and elderly; male and female; rural and urban; and affluent and not-so-affluent. Potential uses run the gamut of recreational and transportation possibilities, restrained only by weather and perhaps distance.

On the other side of the controversy is safety. Many authorities in the field of safety believe that introduction of the moped into the American traffic stream constitutes a potentially serious traffic hazard which should be carefully controlled through federal, state, and local legislation. Statements in support of this belief encompass opinion and fact and cover many facets of the perceived problem.

In response to the influences of consumer groups, traffic safety authorities, and the moped industry, the federal government has established standards for the manufacture and importation of the moped and state legislatures have reacted variously — from doing nothing (which in some states makes use of the moped illegal and in others leaves its use virtually unregulated), to simply defining or minimally regulating the moped, to strictly regulating its sale and restricting its use.

The Purposes of This Report

The abundance of information, opinion, and fact regarding the moped and the diversity of its treatment in state laws renders the moped issue an unwieldy one. In an effort to help bring the moped problem into better perspective, this report is intended to accomplish several purposes:

1. to present the history and "state of the art" of the moped in Ohio and in the other states — where we have been, where we are now, and where we appear to be going;

2. to analyze the various issues that have been raised regarding the moped and the importance of those issues for the future directions of our research, legislation, industry and education; and

3. to offer suggestions for future action by the public, by legislators, by industry, and by the traffic safety and driver education community.

History of the Moped

Europe

While mopeds are a fairly recent addition to the U.S. traffic composition, they have been popular in Europe for many years. The economic climate of postwar Europe in the 1940s provided an eager market for this economical means of short distance transportation. Europeans, long accustomed to small automobiles and two-wheeled vehicles, accepted the motor-assisted bicycle[2] as a useful and relatively easy-to-use means of getting around without spending large amounts of money on high-cost fuel.

Over the years, refinements in the design and construction of the vehicle have increased its popularity to present levels. Today, it is estimated that more than 18 million mopeds are in use worldwide. France alone has an estimated 6 million mopeds in use, and a full 10% of the French population constitutes the user group (1).[3]

United States

Inevitably, the moped found its way to America. The exact date of its introduction here is unknown, but its presence began to gain attention in 1973 when questions regarding moped imports were raised.

> In 1973, the National Highway Traffic Safety Administration received reports that mopeds made by S.I.N.F.A.C.,[4] a French manufacturer, were being imported without lighting equipment required by federal motor vehicle safety standards. NHTSA's investigation resulted in a $10,000 civil penalty against the French manufacturer. In the meantime, S.I.N.F.A.C. and several other French moped makers[5] petitioned NHTSA to amend federal motor vehicle standards "to recognize the power assisted bicycle as a separate category of motor vehicle and to establish specific safety standards for that vehicle appropriate to its low power and speed." (2:2)

The motor-assisted bicycle at that time was classified as a "motor-driven cycle," a subcategory of "motorcycle" that was defined as "a motorcycle with a motor that produces 5-brake horsepower or less." As such it was required to meet federal motor vehicle safety standards, most importantly the ones covering lights, hydraulic brake systems, and controls and displays (3).

The S.I.N.F.A.C. petition, filed February 14, 1974, did not, however, result in the establishment of a new vehicle category. The NHTSA determined that "the problems of conforming to the standards encountered by vehicles with 1.5 horsepower or less do

[2] Moped has become the accepted term for the vehicle discussed in this report. "Motorized bicycle" and "motor-assisted bicycle" have been used synonymously with "moped" in the past and continue to be used in the laws of many states. Today, "motor-assisted bicycle" is used by some to differentiate the pedal bicycle with an added helper motor from the more technologically refined moped with a built-in motor. At the time in moped history under discussion here, the vehicle coming into use was the bicycle-with-helper-motor forerunner of the present-day moped, and is therefore referred to as a motor-assisted bicycle. Throughout this report, the various terms are used interchangeably in referring to the moped, without attempt to differentiate between technological stages of development.

[3] Citations in parentheses refer to sources listed in the Notes, which follow the text of this report. The first number indicates the document; the second (if any) indicates the page number in the document cited.

[4] Societe Industrielle Nouvelle de Fabrication pour L'Automobile et le Cycle.

[5] Cycles Peugeot and Ateliers de la Motobecane (manufacturers) and Bermuda Bikes, Inc. and Robert F. Smith (retail dealers).

not appear to be sufficiently different from those of motor vehicles between 1.5 and 5 horsepower to justify a separate category." (3) Instead, on April 12, 1974, they agreed to make "certain minor modifications in the standards to ease the burden of compliance without jeopardizing basic safety performance." Those modifications were:

1. exemption from the requirement for turn signals;

2. reduction of required stop-lamp photometric output to one-half;

3. exemption from the brake-fade requirements and inclusion of maximum stopping distances for 15, 20, and 25 miles per hour; and

4. permissible placement of the rear brake control on the left handlebar rather than at the right foot.[6]

The petitioners argued that, because of the low horsepower and consequent low maximum speeds, the need for forward lighting was reduced below that required under existing standards and that this standard should also be modified. The NHTSA, however, found this claim insufficiently supported by evidence and left the forward lighting standard unaltered pending further study (4).

The modifications in the safety standards took effect October 14, 1974, and opened up the American import market to European manufacturers (at that time the only manufacturers) of mopeds. With the energy crisis, accompanying high cost of fuel, and other environmental problems coming to the fore in the United States at the same time, the popularity of the moped was growing and the moped "boom" began.

In 1975, 25,000 mopeds were sold in America — as many as had traveled U.S. roads for the previous twenty years. In 1976, that annual sales figure was tripled, with 75,000 sold.[7] In 1977, imports increased 150% over 1976 (562% over 1975) and the year's sales reached 150,000. A comparison of first-half 1976 and first-half 1977 revenues ($6.8 million and $22.1 million respectively) reveals a dollar market increase of $15 million or 223%. Projections for 1978 sales vary with the person or organization making the prediction, but 250,000 appears to be a conservative estimate acceptable to most. Some spokespersons for the industry have predicted that 1978 will not be a "boom" year, but a year of steady market growth nationwide as the anticipated 1980 market peak is approached.[8]

One Department of Transportation study estimates that "three million mopeds could be buzzing over U.S. roads by 1980." (6)

[6] The text of the revised standards appears in Appendix A.

[7] It is interesting to note that 1976, because of the proliferation of new state moped legislation, was the first complete year of moped sales in many states.

[8] Serge Sequin, of Motobecane and the Moped Association of America, in an interview with *Moped World* magazine in 1978 described this market peak as a "maturity level" rather than as market saturation. According to Seguin, demands for new mopeds to replace worn ones, for new models with added features to replace still-working but outdated models, and for second and third mopeds within families will provide a substantial ongoing market after the initial sales peak (5:5).

Impact of Moped Market Growth

With the appearance of growing numbers of mopeds on U.S. roads, the states began to face the problem of regulating use of a vehicle which did not fall comfortably within existing definitions of either the bicycle or the motorcycle. Some states treated mopeds as bicycles, for which licensing, registration, testing, and safety equipment generally were not required. Others treated them as motorcycles, with full licensing requirements (minimum age of 16 or older, knowledge and skill tests, insurance, safety equipment, or other requirements).[9] Others created a new category for the moped, with requirements more stringent than those for bicycles and less so than those for motorcycles. As will be discussed further, even the laws specifically constructed for the moped varied substantially from one state to another. The result was an array of vastly inconsistent laws for moped use across the nation.

The following year, in a memorandum to the Governors' Highway Safety Representatives and Legislative Reference Bureaus, Edward F. Kearney, executive director of the National Committee on Uniform Traffic Laws and Ordinances, urged the states to conform with the Uniform Vehicle Code (UVC) in defining mopeds as motor vehicles and not as bicycles. He raised a number of questions regarding motorized bicycles that needed to be considered by each state developing moped legislation:

1. Should a motorized bicycle operator be required to wear a helmet?
2. Should a motorized bicycle be registered as a motor vehicle? Should insurance be required?
3. Should a motorized bicycle operator have a driver's license?
4. Should a motorized bicycle be prohibited on sidewalks, bicycle paths, or bike-only lanes?

According to Kearney, the states should be conforming with the UVC in regulating use of mopeds and, until the UVC was studied further (and perhaps modified if warranted), the code required affirmative answers to all these questions (7).

The Motorized Bicycle Association,[10] meanwhile, strongly advocated that legislation and regulations relating to mopeds "be based upon the recognition of the vehicle as a bicycle, not as a motorcycle or other heavier motor vehicle." Stating that

> the object of safe, reasonable motorized bicycle legislation should be to: 1) define the motorized bicycle separately in the state law; 2) remove it from the definitions of motor vehicle, motorcycle, motor driven cycle, and/or motor scooter in the state law; 3) establish operating regulations consistent with the low acceleration, power, and speed of the vehicle, and its simple operation (8:4),

the Motorized Bicycle Association recommended that state motor vehicle codes be amended as outlined below.

[9] In some states this in effect outlawed mopeds, since mopeds did not meet equipment specifications required for motorcycles.

[10] MBA, representing moped manufacturers and distributors, has since changed its name to Moped Association of America (MAA) to reflect standardization of terminology for the vehicle.

1. Insert the following definition of motorized bicycle:

   a bicycle with fully operative pedals for propulsion by human power, and automatic transmission, and a motor with a cylinder capacity not exceeding 50 cc, which produces no more than 1.5 (or 2) brake horsepower, and is capable of propelling the bicycle at a maximum design speed of no more than 25 mph (or 30 mph) on level ground.

2. Amend the definitions of motor vehicle, motorcycle, motor-driven cycle, and motor scooter to exclude motorized bicycles.

3. Prohibit the use of motorized bicycles on interstate highways, limited access highways, or sidewalks.

4. Establish a minimum operator age of 14 or 15, with no license necessary (or, if required, the license be any license or a special motorized bicycle license obtainable without a road test), and require the operator to obey all traffic laws and regulations (8:4-5).

They further stated that

> the motorized bicycle will operate safely within the above limits, and at a speed fast enough (although slower than the maximum speed which can be attained by the ordinary 10-speed pedal bicycle) to keep up with normal traffic, thereby presenting no obstacle to faster moving vehicles on the road (8:5).

The NHTSA, with such strongly opposing influence from these various sources and with states struggling to establish sound standards for moped use and looking to the NHTSA for guidance and information in doing so, found itself unprepared to answer with authority the inquiries it was receiving. Consequently, in November 1975, the NHTSA opened Docket 75-29 "to receive comments on the operational safety of motorized bicycles, commonly known as mopeds." The announcement stated that this step was being taken "to ensure that information is available to federal, state, and local governments to guide them in regulating the use of mopeds on the public highways." (9) According to a NHTSA spokesperson, the agency had no plans to issue guidelines for states to follow in regulating highway use of mopeds unless the comments it received warranted such action (10). The notice of the docket opening further alerted potential commenters that information then available to the NHTSA indicated that

> mopeds are capable of operating for sustained periods at speeds up to 30 miles per hour, and that a large proportion of motorcycle accidents occur at speeds between 20 MPH and 30 MPH. Consequently, moped accident patterns appear to be similar to those of other classes of motorcycles rather than those needed to operate a bicycle. It would also appear that because mopeds have limited ability to sustain speeds above 30 MPH, their travel on high speed highways should be restricted. Comments and data concerning these preliminary conclusions are also requested (9).

By the June 15, 1976 closing of the docket, many comments had been received. Respondents included individuals, importers, dealers, insurance companies, and local and state governments. Comments received concerned safety standards, accident reporting procedures and forms, and legislation related to moped use. Many letters,

written by or at the urging of manufacturers and dealers, advocated liberalization of moped laws.

Prior to 1975, only six states had classified mopeds as other than motorcycles, while regulations in the majority of states had applied full motorcycle requirements. After 1975, however, when proliferation of state legislation specifically relating to mopeds began, many states enacted laws which defined mopeds as a separate category of vehicle, different from both the bicycle and the motorcycle, and some states adopted legislation which included mopeds in the definition of bicycle, thus effectively deregulating the vehicle. According to the NHTSA, the laws in several such states failed

> to provide adequate regulatory safeguards for moped riders and the public, thus unintentionally creating circumstances in which the number of moped accidents and the consequent cost of these accidents in terms of death, injury and societal costs are greater than they ought to be (1:4).

History of Ohio's Moped Legislation

Ohio's steps in revising its moped laws to address more adequately the situation of growing numbers of mopeds on Ohio roads have, in some ways, been typical of state legislative actions across the nation. The brief history of Ohio's moped laws that is included here is an example of the kind of legislative activity that has made up the surge of new and revised moped legislation in the United States.

Prior to 1977, the operation of mopeds in Ohio was governed by Section 4511.01(G) of the Ohio Revised Code which included within the definition of "bicycle" any bicycle "fitted with a helper motor rated less than one brake horsepower transmitted by friction and not by gear or chain, which produces only ordinary pedaling speeds up to a maximum of twenty miles per hour." For such vehicles there were no requirements for vehicle registration, operator license, or wearing of safety equipment and no minimum age limit for the operator. Any vehicle that exceeded any of these limits, either by original design or because of alterations made after purchase, was classified as a motorcycle. Because motorcycle operators were required to have a license and (at that time) to wear safety equipment and because their vehicles were required to meet more stringent equipment standards than mopeds, a person operating a higher-powered moped could be cited for a number of traffic violations. For determination of the correct category (bicycle or motorcycle) of a particular moped model, manufacturers had to submit an independent laboratory report on the vehicle to the Ohio Department of Highway Safety (ODHS) who in turn publicized a list of approved moped makes and models."[11]

In 1976, both state level officials and local jurisdictions in Ohio who had become increasingly aware of a growing moped problem on their streets — especially that caused by young and inexperienced operators — began to work toward revisions in the Code that would regulate moped operation more closely. In January 1977, ODHS accident reporting forms were changed to include a moped category, facilitating the collection of moped accident data. Early that same year, legislation was proposed to amend the existing laws.

[11] In 1977, ODHS was approving for operation in Ohio vehicles with friction components even though gears or chains were involved. This was in keeping with court decisions in other jurisdictions, with an opinion of the Ohio Attorney General, and with reports and evaluations of engineers (11:1).

Amended Substitute Senate Bill 100 proposed a separate classification for motorized bicycles with the following provisions:

1. Motorized bicycles were defined as
   - having 2 tandem wheels or 1 in front and 2 in back
   - capable of being pedaled
   - equipped with a helper motor of not more than 50 cc and 1 bhp and capable of speeds not over 20 m.p.h. on a level surface.
2. Motorized bicycles were excluded from the definitions of motor vehicle, motorcycle, and bicycle and included in the definition of vehicle.
3. For a person to operate a motorized bicycle on public or private property used by the public for vehicular travel or parking, the following were required:
   - minimum operator age of 14 years
   - an operator's license or a motorized bicycle license (valid for 4 years and issued after the person passed a test)
   - a motorized bicycle equipped in accordance with rules set by ODHS and in good working order.
4. ODHS was empowered to promulgate rules regarding equipment, testing (including at least vision and rules of the road), and operator qualifications.
5. Motorized bicycles were exempted from motor vehicle lighting and brake standards and placed instead within ODHS rules.

The bill was passed in July 1977, approved in August, and effective in November 1977. Specific provisions within the bill became effective April 1, 1978.

Pursuing its authority to promulgate rules governing licensing and operation of mopeds in Ohio, a public hearing was held by ODHS on December 15, 1977, to receive testimony on proposed rules. Briefly, the proposed rules called for:

1. a manufacturer's report on the horsepower, speed, piston displacement, and design and equipment of mopeds intended for sale in Ohio and a manufacturer's certification of compliance with equipment rules;
2. brake systems, steering, fuel systems, exhaust systems, chain and belt guards, vehicle stand, controls, lighting, headlamp indicator light, and audible signalling device in conformance with FMVSS standards or other specified safety standards, whether assembled by manufacturer or other person;
3. seat or saddle not more than 25 inches above ground with operator seated, vehicle width of 32 inches, minimum inflated tire width of 1.75 inches, minimum tire diameter of 19 inches, and maximum height of handlebars (above seat with operator seated) of 15 inches;

4. prohibition against carrying more persons than the number for which the vehicle is designed and equipped;

5. license application forms and procedures for obtaining a moped license, including requirement of parental signature and evidence of age for applicants under 18;

6. a vision test the same as that required for an operator's license;

7. a written test administered in the same manner as the written test for an operator's license, including 40 questions (20 on rules of the road and 20 on signs) 75% of which must be answered correctly;

8. no requirement for a road test or driver education; and

9. equal treatment for handicapped applicants, with a review of handicap and test results by a medical review board.

Testimony on the proposed rules was received from various individuals at the hearing. A representative of the Motorized Bicycle Association spoke in support of the rules inasmuch as they closely reflected federal standards, recommended that design and equipment be deleted from the required manufacturer's lab report, and urged flexibility in application of the vision standards. A representative of one of the large manufacturers recommended tightening the rule on carrying passengers because, in the opinion of his company, this rule as written could be interpreted as permitting the operator to add passenger accessories and thus equip the vehicle for another person — which, in the speaker's opinion and those of other persons giving testimony, was unsafe. (This change was not adopted.) Local distributors and citizens also offered testimony recommending elimination of the requirement for a shut-off valve meeting FMVSS standards because some mopeds do not have such a valve and replacing it with a requirement that any such valve that ***does*** exist meet FMVSS standards; urging a tighter no-passenger rule; and recommending that placement of the audible signalling device not be specified because placement varies among moped models (this last change not adopted).

The proposed rules, with minor changes,[11] were filed January 19, 1978, and became effective April 1, 1978, concurrent with the new moped law. The full text of the revised rules, as filed, is presented in Appendix B.

Moped Accident Data

One factor which has contributed to the inconsistent approach to state moped legislation has been the lack of moped accident data in this country. Insufficient data have been available to enable authorities to delineate problem areas, relate them to state legislative approaches, or to compare the efficacy of the different approaches in supporting the establishment of a safe traffic environment. In most jurisdictions there has been no separate category for mopeds in accident reporting procedures and forms; moped accidents have been variously recorded as either bicycle accidents or motor-

[11] Design and equipment were removed from the scope of the independent lab report; the requirement for a shut-off valve was removed and compliance with FMVSS 123 was required *if* a valve was present; and test results were clarified so that 75% of each section of the test must be answered correctly rather than 75% of the total. Other changes were minor or editorial.

cycle accidents, depending on the inclination of the investigating officer. Moped statistics thus have been "buried" within the other statistics and could not be analyzed independently to provide an accurate picture of moped safety in America. While the reporting situation has been changing as more and more localities revise their procedures and forms to include the moped as a separate category of vehicle, sufficient "clean" moped accident statistics have not yet been available to enable the states to examine the status of moped safety as it relates to existing legislation.

Accident statistics from Europe have traditionally been cited, especially by advocates of liberalized moped legislation, as evidence of the moped's comparative safety in the traffic mix (and therefore as justification for legislatively treating mopeds more as bicycles than as motorcycles). The Motorized Bicycle Association cites accident rates for mopeds in France as being 6½ times lower than those for motorcycles and 1½ times lower than those for cars (12). A 1971 study by the European Conference of Ministers of Transport, on the other hand, found a death rate (fatalities per 100,000 vehicles) of approximately 8 for bicycles, 51 for mopeds, and 171 for motorcycles. These figures place the moped fatal accident rate at 6 times higher than for bicycles and 3 times lower than for motorcycles (1:2).

No matter how one interprets these figures with regard to mopeds, there remains a question as to whether European figures can truly be used to represent the American traffic situation. Those who think they cannot, point out such differences between the American and European traffic pictures as the degree to which automobile drivers are accustomed to sharing the road with small, two-wheeled vehicles; the drivers' attitudes toward these vehicles; prevalent driving habits; relative sizes of vehicles and roads; and other factors.

A pressing need has been felt, therefore, to generate accident statistics within our own traffic situation in order to examine the efficacy of existing legislation and to identify any need for new regulation.

Current Research

The NHTSA has sponsored several U.S. research projects, described below, to gather information about moped use and accidents.

1. The University of Southern California multidisciplinary accident investigation team has conducted in-depth, on-site investigations of motorcycle and moped accidents in California. This study, the investigation phase of which has been completed, included 30 moped accidents. At the time this report was prepared, the results from the study had not been reported; however, several general results were apparent: (a) speeds of the accident-involved mopeds were slower than those of the motorcycles studied, (b) injuries were less severe in the moped accidents, and (c) 30 was too small a number of cases from which to generalize the findings to moped use in general. A larger study will be sponsored by the NHTSA later this year, probably in the California area, to gather additional accident results for study. (1:4) (13)[13]

[13] California has been a popular site for such investigations because of the high degree of moped use in that area. In a 1978 survey of bicycle and moped dealers, for example, it was shown that surveyed dealers in the West averaged 76 annual new moped sales, as compared with 44 on a national average. Other annual area sales figures reported were Midwest 5, East 16, and South 17 (14:4).

2. "An Analysis of Mopeds as a Potential Safety Problem in the United States" is a study begun by the Highway Safety Research Center at the University of North Carolina to "formulate and exercise a mathematical model to forecast the potential use of mopeds in this country as well as the number, type and severity of accidents which may result from the increased use of mopeds." (1:5) As of June 1978, the literature search had been completed, an accident data search was underway, and a market research stage was to follow. The study is expected to be completed by January 1979.

3. "Accident Avoidance Capabilities of Mopeds" is a study conducted in California by Systems Technology, Inc., to evaluate "the acceleration, braking, handling, and stability characteristics of mopeds using test methods previously developed for motorcycles." (1.5) Another aspect of this study is to assess the increase in top speed capability which can be obtained through minimum modification of the moped through addition of purchased equipment. Due in December 1978, the results will be used in determining whether additional Federal safety standards are needed for mopeds to improve their accident avoidance capabilities.

4. The National Personal Transportation Study, being conducted by the Bureau of Census, involves interviews with 20,000 U.S. households to determine modes of personal transportation, vehicle ownership, frequency and type of use, mileage, and other demographic information (not including accident data). The interviews have been completed and the results are in the process of being put on tape. Comparatively little use of mopeds within the interviewed population is expected to be found, so it is unlikely that this study will add significantly to the existing information base about mopeds.

5. A study of methods to increase the conspicuity of motorcycles and mopeds and their riders was conducted by the Highway Safety Research Institute at the University of Michigan. The results of the project, to have been completed by October 1978, include recommendations for ways to make mopeds and their riders more visible to other traffic.

In California, where reporting procedures include the moped, accident statistics for 1977 revealed 1,119 total moped accidents of which 88% involved injuries (897 minor, 89 severe, and 4 fatal). The 990 moped injuries/fatalities compared with 236,919 for cars, 27,903 for motorcycles, 9,739 for bicycles, and 14,461 for pedestrians. It should be remembered in comparing these figures, however, that the number of operating vehicles has not been taken into account. Other results of the accident analysis are discussed later in this report (15).

Unfortunately, neither present nor near-future studies in the United States are expected to yield results sufficient in scope to justify their use in formulating general problem delineations and solutions in relation to the American traffic situation. Mopeds will need to have been in use in the U.S. in much greater numbers and for an extended period of time before such data will be readily available (13).

In the meantime European statistics, used with prudence, will have to serve as the primary information base about moped accident involvement. One European study which has proven particularly useful is the German study "Collision Characteristics and Injuries to Motorcyclists and Moped Drivers." (16) From this study, in which 1,206

accidents (including 1,465 operators and passengers) involving two-wheeled motorized vehicles were analyzed, several findings emanated:

1. Mopeds have a lower frequency of accidents than motorcycles; once involved in an accident, however, mopeds and motorcycles have almost identical risk of injury. That is, the lower speed of the mopeds does ***not*** reduce the injury risk.

2. Drivers of mopeds and motorcycles as a group have an injury risk 10 to 15 times greater than drivers of cars.

3. Passengers on two-wheeled vehicles have an injury risk 1.5 times higher than drivers of these vehicles.

4. In lateral front-end collisions with cars, motorcycle drivers are likely to be thrown over the car whereas moped drivers are thrown against or on top of the car. This increases the risk of fatal injury fourfold for moped drivers.

5. The efficiency of safety helmets is higher for motorcycle drivers than for moped drivers, probably because motorcyclists tend to wear better helmets and to fasten them properly.[14]

On the basis of the moped-motorcycle relationship evidenced in these findings, it becomes possible to apply to the moped situation the motorcycle accident results which are more readily available in this country and to begin to evaluate current issues being discussed relative to the moped.

[14] The study described here also proposed a number of safety related measures applicable to the design of cars and trucks and of two-wheeled motorized vehicles and to moped and motorcycle drivers and the laws that govern their performance. These measures are discussed later in this report.

Current Legislation

As mentioned earlier, state legislation specifically related to mopeds began to proliferate in 1975. Since that time, the nationwide legislative situation has remained in a state of flux, with additional states proposing and enacting new or revised moped laws each year. To date, 36 states and the District of Columbia have addressed the status of mopeds on their roads, but in widely divergent manners.

There are four broad areas to which moped laws are addressed:

1. ***definition*** (as bicycle/motorcycle/moped) and ***specifications*** of the vehicle — maximum speed, horsepower, engine displacement, and dimensions;

2. ***type of license required*** — operator's, motorcycle, moped, special endorsement, learner's permit, or none;

3. ***requirements for obtaining license*** — registration of vehicle, required equipment, vehicle inspection, minimum operator age, tests, and insurance or financial responsibility; and

4. ***operation of the vehicle*** — access to bicycle lanes adjacent to roads, bicycle paths, recreational trails, limited access highways, and sidewalks; daytime use of lights; use of protective headgear and eye protection; carrying of passengers and packages; location of vehicle in traffic; and applicable rules of the road.

Within these four areas, not all states address all items and, among those that do, they address them differently.

Figure 2 presents an overview of the current status of state moped legislation. Unless otherwise noted, the information was obtained directly from state officials, state legislative reference bureaus, or printed copies of the legislation. Where information is not given for a particular item, either the point is not addressed in the law or the information could not be obtained. It should also be noted that prohibited use of mopeds on limited access highways is noted only where such use is ***specifically*** prohibited in the law; however, in most states, a maximum moped speed of 30 m.p.h. or less is indicated. Therefore, mopeds could not attain minimum speeds of limited access highways and would therefore be prohibited from using them. A summary of current moped legislation in Canada is presented for comparison in Appendix C.

Figure 2

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle/Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire/Wheel Dimension	Motorized Bicycle/Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance/Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
AK	X[1]																														[1]A bill to define mopeds died in committee in 1978.
AL	X[1]																														[1]Two bills introduced earlier this year died.
AR°		X			30	50	2	–	X		X				NO	NO	14		X	X	NO				NO	NO	NO	NO			
AZ°		X			25	50	1.5	–			X				X	NO	16	X			FR						NO	NO			
CA		X			30	–	2	–			X	NO	X		NO[1]	NO[2]	16[3]	X			FR°	X[4]	NO	NO	X[4]	NO	NO	NO	X[5]		[1]Proposed bill would require registration. [2]All lighting must be in good working order. [3]Age 15½ and driver education for learner's permit. [4]Reasonable speed in bike lanes; at speeds above 30, considered a motor vehicle and can be cited as unregistered motorcycle; with learner's permit, no after-dark use, and no freeway use; with maximum speed of 30, mopeds naturally excluded from any road with a higher minimum speed. [5]If seat and footrests provided; not with learner's permit.

°Information obtained from secondary source (primarily Motorcycle Industry Council *State Legislative Reports* (17) and *Government Relations Bulletins* (18)). Where symbol appears by name of state, all information was so obtained; otherwise, only the items marked were from secondary sources.

[1], [2], [3], [4], [5] See notes to the right, under "Comments."

– Not specified. < Less than.

Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle / Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire / Wheel Dimension	Motorized Bicycle / Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance / Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
CO°		X			30	50	2	–			X		X		X	NO	16	X			NO	X		NO	NO	NO	NO	NO	[1]		[1]If equipped for passenger.
CT°				X	30	50	2	–		X	X				NO	NO	16	X			NO	NO°					NO	NO			
DC		X[1]			25	50	1.5	16″	X		X				X°	X	16°				FR°		NO	NO		NO	NO	NO			[1]Weight not more than 120 lbs.
DE		X			25	55	1.5	20″			X				X	NO	16	X			NO		NO[1]	NO			NO	NO		[1]	[1]Unless motor turned off. [2]Regulations applicable to bicycles apply.
FL				X	25	–	1.5	20″						X	X	NO	15				NO	NO°	NO	NO		NO	NO	NO	X[1]	[1]	[1]If equipped for passengers. [2]No more than 2 abreast; as far to the right as possible.
GA	present		X							X					X	X	16	X										X			
	pending	X			30	50	2				X				NO	NO	15											X	X[1]		[1]Headgear required of passengers.
HI		X			35	50	1.5				X				X	NO	15	X			NO	X	X[2]			NO			NO	[3]	[1]Persons who rent or lease required to have liability insurance; operators and owners subject to no-fault insurance requirements. [2]Unless prohibited by signs. [3]Single file and to the far right.

Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle/Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire/Wheel Dimension	Motorized Bicycle/Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance/Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
IA°		X			25	50	–	–	X		X				X	NO	14		X	NO	FR						NO	NO			
ID	X																													
IL		X			30	50	2	19"			X	NO			X	NO	16°	X			FR°				NO		NO	NO	X[1]		[1]Only if equipped with passenger seat, handgrips, and footrests.
IN		X			25	50	1.5	–						X	NO	NO	15				NO				NO	NO	NO	NO			
KS		X			30°	50°	2°		X		X				NO	NO	14		X	NO	NO[4]							NO			
KY		X			30	50	2		X		X		X		NO	NO	16		X	NO	NO				NO			NO			
LA°		X			25	50	1.5	–			X				NO	NO	15	X			NO					NO		NO			
MA		X			25	50	1.5	–			X		X		X	NO	16	X			NO	X	NO		NO[1]		NO	NO[2]	X	X[3]	[1]Where signs specifically prohibit bicycles. [2]Bill now in committee would require operators and passengers under 18 to wear helmet. [3]May keep to right when passing vehicles moving in the travel lane of the way.
MD		X			–	50	1.5	14"	X		X				NO	NO	16		X												

Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle/Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire/Wheel Dimension	Motorized Bicycle/Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance/Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
ME		X			30	50	2				X	X			X	NO	16	X							X	X[1]	X		X[2]	X[3]	[1]Not to be operated on any way on which bicycles prohibited. [2]Only if designed and equipped for passengers. [3]Single file and to the far right.
MI		X			25	50	1.5	—	X		X				X	NO	15		X	NO	NO		NO[4]		NO	NO	NO	NO	NO	NO	[1]	[4]All motor vehicle rules of road apply; must stay as far right as possible; no more than 2 abreast; may pass vehicles but not go between lanes of traffic; handlebars no more than 15" above seat; no parcels held in hand or under arm.
MN		X			30	≤50	2	—	X		X				X	NO	15		X	X	NO						NO	NO				
MO			X[1]																												[1]Bills introduced to define mopeds died in committee or did not pass in 1978.
MS			X[1]								X				X	X	15	X										X			[1]Mopeds not defined; motorcycle includes any motor vehicle with saddle for use by rider, with not more than 3 wheels.

Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle/Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire/Wheel Dimension	Motorized Bicycle/Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance/Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
MT			X																											
NC				X	20	–	1	–						X	NO	NO	16	NO	NO	NO	NO						NO	NO			
ND	X																													
NE	X[1]																													[1]Classed as minibike, which is illegal on roads, if tires less than 14", seat less than 25" high, engine less than 45cc; a bill that would have defined and regulated mopeds was vetoed in 1978.
NH		X			30	50	2	–			X				X	NO	16	X			FR[a]				NO[1]	NO	NO	NO		[3]	[1]If posted against their use. [3]Drive on right-hand side, no more than 2 abreast; no parcels held in hand or under arm.
NJ		X			25	< 50	1.5		X		X		X[1]		NO	NO	15[2]		X	X	X				NO		NO	NO	NO	[3]	[1]Daylight hours only. [2]Senate Bill 208 (still in committee as of 8/18/78) would raise minimum age to 17. [3]Drive on right side of road, single-file.
NM[a]		X			25	50	–	–	X		X				NO	NO	13				NO						NO	NO			

Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire Wheel Dimension	Motorized Bicycle Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
NV*		X			30	–	–	–			X				NO	NO	16	X			FR						NO	NO			
NY	Limited Use Motor Cycle																														
					31-40	–	–	–		X			X		X	X	16		X	X	INS				NO		X	X			[1]Right or left lane, not shoulder.
					21-30	–	–	–			X		X		X	NO	16	X			INS				NO		X	X			[1]Only in right lane or shoulder.
					^21	–	–	–			X		X		X	NO	16	X			FR				NO		X	NO			[1]Only in right lane or shoulder.
OH		X			20	50	1	19"	X	X	X				NO	NO	14		X	NO	NO	X	"	"	NO	NO	NO	NO	"		[1]Depends on rules of municipality, park, or other owner of the area through which the path or trail extends. [2]Only if originally designed for passengers.
OK	X																														
OR			X[1]							X	X				X		16	X		X								NO[2]	X		[1]Equipment specifications for motorcycles apply, including head and tail lights, turn signals, rearview mirror, and others. These may preclude many models from being operated legally in the state. [2]Required if under 18.

Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle/ Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire Wheel Dimension	Motorized Bicycle/ Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance/ Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
PA		X			25	50	1.5	–	X	X	X		X		X[1]	NO[2]	16	X			INS				NO		NO	NO[3]	•	•	[1]House Bill 1193, in committee as of 8/23/78, would eliminate registration and require protective headgear; Senate Bill 1444, in committee 8/23/78, would also eliminate registration. [2]Senate Bill 766, in committee 8/23/78, would require annual inspection. [3]Only if designed for passengers. [4]No parcels held by driver.
RI[4]		X			25	–	1.5	–			X				X	NO	16	X			NO						NO	NO			
SC				X	20[1]	–	< 1	–						X	NO	NO	12	NO	NO	NO	NO						NO	NO			[1]When operated over 20 mph, considered a motorcycle.
SD[4]		X			30	50	2	–			X[1]		X[1]		NO	NO	14[1]	X			NO							NO			[1]Instruction permit, age 14; restricted permit, ages 14-16, 6 a.m. - 7 p.m. only; driver's license, age 16.
TN[4]		X			25	50	1.5	–			X				X	NO	16	X		X	NO						X	NO			
TX		X			20	< 60	–	–	X		X				X	X	15		X	NO	NO						NO	NO			
UT	X																													

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Figure 2 (Continued)

Overview of State Moped Legislation

State	Definition				Specifications				Type of License						Licensing Requirements							Operation									Comments
	No Legislation	Motorized Bicycle/Moped	Motorcycle	Bicycle	Speed	CC	Brake Horsepower	Tire Wheel Dimension	Motorized Bicycle/Moped	Motorcycle	Motor Vehicle Oper. License	Special Endorsement	Learner's Permit	No License Required	Vehicle Registration	Equipment Inspection	Minimum Age	Regular Driver Tests	Written Test	Road Test	Insurance/Financial Resp.	Bike Lanes	Bike Paths	Trails	Limited Access Roads	Sidewalks	Daytime Use Of Lights Required	Safety Equipment	Passengers	Other	
VA				X	20	—	—	—						X	NO	NO	16				NO						NO	NO			
VT		X			30	50	2	19"			X				X	X	16	X			FR[1]						NO	NO	[3]	[3]	[1] In certain cases. [2] Only if designed to carry passenger (incl. footrests). [3] Entitled to full use of lane, single file only; no parcels held by driver.
WA	X											X							X	X											
WI		X			30	50	—	—			X				X	NO	16	X			NO	[1]	NO	NO	NO	[2]	NO	NO	NO	[3]	[1] Only when posted requiring their use by mopeds. [2] Parking permitted on sidewalks if pedestrian traffic not impeded. [3] Single-file, extreme right lane where speed limit is over 25 mph.
WV[4]		X			30	50	2	—			X				X	X	16	X			FR				NO		X	NO			
WY	X																														

The legislative patterns and trends represented in Figure 2 will be discussed in some detail under the topic of safety issues. A few general trends, however, merit mention at this time.

Definition

At the present time 36 states and the District of Columbia[15] — or 72% — have moped laws, five (9%) define mopeds as motorcycles, and nine (17%) have no legislation regarding mopeds. Of the 37 moped states, the vast majority (32, or 86%) provide a separate moped category for this vehicle and six (16%) place it in the bicycle category.

Specifications

In the 37 moped states, all except one regulate maximum speed. Designated maximum speeds are summarized in Table 1.[16]

Table 1

Maximum Speed

	Speed (m.p.h.)				
	20	25	30	35	None spec.
Number of states	5	14	15	1	1
Percent of moped states[17]	14%	38%	41%	37%	3%

Another way of regulating the legal power capacity of mopeds is by setting maximum brake horsepower (bhp). Of the moped states, 31 (84%) regulate maximum bhp, as summarized in Table 2.

Table 2

Maximum Brake Horsepower

	Maximum brake horsepower			
	1 or <1	1.5	2	None spec.
Number of states	4	14	13	6
Percent of moped states	11%	38%	35%	16%

[15] The 36 states and district having moped laws, hereafter referred to as "moped states," include: Arkansas, Arizona, California, Colorado, Connecticut, District of Columbia, Delaware, Florida, Hawaii, Iowa, Illinois, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Michigan, Minnesota, North Carolina, New Hampshire, New Jersey, New Mexico, Nevada, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, Vermont, Wisconsin, and West Virginia.

[16] New York is not represented here because its moped law, which is more complex than the laws in other states, sets three different maximum speed ranges with different requirements.

[17] Percentages in this and other tables are rounded, and may not equal 100%.

Maximum engine displacement is also used to define the legal capacity of mopeds. Of the 37 moped states, 29 (78%) set such a limit, as summarized in Table 3.

Table 3

Engine Displacement Limit

	Maximum cc			
	50 or <50	<55	<60	None spec.
Number of states	27	1	1	8
Percent of moped states	73%	3%	3%	22%

Other moped specifications occasionally applied in state laws include wheel or tire dimensions, height of seat, and height of handlebars.

Type of License

Of the 37 moped states, 32 (86%) require the operator to have a license. All of these permit moped operation with a regular motor vehicle operator's license (or, in many cases, any operator's license). Of these states 13 (40%) also offer a special moped operator's license, often at a slightly younger age than that required for an operator's license. Policies vary as to whether a learner's permit is sufficient for moped operation.

Licensing Requirements

All moped states specify a minimum operator age, with the vast majority (81%) requiring the age of 15 or 16, in keeping with the ages for operator's licenses. The age requirements are summarized in Table 4.

Table 4

Minimum Operator Age

	Minimum Age				
	12	13	14	15	16
Number of states	1	1	5	8	22
Percent of moped states	3%	3%	13%	22%	59%

Vehicle Registration and Inspection

The trends in state legislation are slightly in favor of registration and strongly against inspection. The moped states' requirements in these areas are summarized in Table 5.

Table 5

Registration and Inspection Required

	Registration		Inspection	
	Yes	No	Yes	No
Number of states	21	16	4	33
Percent of moped states	55%	43%	11%	89%

License Examinations

In moped states that require a regular motor vehicle operator's license, the applicant is required to take the standard driver's license tests. Among the 13 states that offer special moped licenses, only 3 (23%) require a road test; the remainder require only a written test, comparable to the written portion of the driver's test, and often a vision test.

Access

Information on moped operators' access to various rights-of-way is incomplete. However, it would appear that use of bicycle lanes adjacent to roadways is more often permitted than is use of separate bicycle paths or recreational trails. In some cases, local ordinances govern use of separate bicycle facilities by mopeds. Similarly, while a few state laws specifically prohibit use of mopeds on sidewalks, it appears that local ordinances often govern this type of use and that in most cases sidewalk use would not be permitted, except perhaps for parking.

Operation of mopeds on limited access or interstate highways, however, is quite another matter. While not all state laws specifically prohibit moped operation on these higher-speed roads, mopeds whose top speeds are regulated at 30 m.p.h. or less could not, of course, be operated on highways with minimum speeds of 35 to 40 m.p.h.

Use of Safety Equipment and Lights

Most moped states (97%) do not require moped operators to wear protective headgear or eye protection. Only New York requires it for Class B licenses on 21 to 30 m.p.h. mopeds.

Four of the moped states require moped operators to use headlights during daytime hours.

Other Operation Requirements

Other operation requirements commonly addressed in state laws are the carrying of passengers and parcels on mopeds and the moped's position in traffic. Some states permit the carrying of passengers only if the moped is designed for a passenger — that

is, equipped with passenger seat and footrests — and prohibit the driver from carrying packages in the hand or under the arm. Rules regarding position in traffic frequently require the moped to stay as far right as possible, riding single-file or no more than two abreast. Traffic laws applicable to motor vehicles generally apply to mopeds except in states that define mopeds as bicycles, where bicycle rules may apply.

It is interesting to note that, with the exception of minimum age, this composite closely resembles that recommended by the Moped Association of America. (MAA recommends a minimum age of 14 or 15 and prefers no license requirement; but as an alternative to no license, it recommends any operator's license with the option of a special moped license.)

Summary

If a single, representative law were to be drawn from a composite of the most popular variations in the state laws, it would contain the following items:[18]

1. separate moped definition or category
2. 25 or 30 m.p.h. maximum speed
3. 50 cc engine displacement
4. 1.5 or 2 bhp
5. license required:
   - any operator's license
   - (moped license also available)
6. 16 (or 15) years minimum age
7. regular driver's license test (or written part only)
8. no insurance, no safety equipment required
9. no use on limited access or interstate highways or sidewalks.

[18]Parentheses indicate the item was not in a strong majority in the states, but significantly represented.

Popularity

As noted at the beginning of this report, the moped "problem" is basically a controversy over popularity and safety. The moped's growing popularity with operators of all ages[19] can be ascribed to three main factors, discussed in the pages that follow: simplicity, economy, and environmental desirability.

Simplicity

The construction and basic operation of the moped were described earlier. One mounts it like a bicycle, starts the motion by pedaling, flips a switch to make the engine take over, uses a hand throttle to regulate speed and handbrakes to slow or stop, and occasionally assists momentum on an upgrade by pedaling. That's about all there is to operating a moped. Anyone who has driven a bicycle can operate a moped with a minimum of instruction and practice.

In addition to being easy to handle, the moped is easy to maintain. Relatively little goes wrong with a one-cylinder, two-stroke engine. It runs on a mixture of oil and gas, which most owners mix themselves. In cold climates, a few pre-storage steps are in order to insure a smoothly running moped the following spring; draining the tank and doing a little cleaning and lubricating are usually sufficient.

The young, the elderly, and those who shy away from very complex or powerful machines may find this simplicity especially appealing.

Economy

The initial cost of a moped is more than that of an ordinary bicycle, less than that of a motorcycle, and far less than that of a car. Prices, of course, vary with the manufacturer, the geographical area, the model (ranging from basic to deluxe), and the year. Most mopeds fall within a range of $300 (for very basic or "stripped down" models) to $550, with the prices of a few deluxe models reaching beyond $600.[20]

The economy of traveling by moped does not end with the initial investment. Mopeds are extremely economical in terms of mileage. Most moped models are advertised as consuming fuel at rates ranging from 120 to 218 m.p.g., the most common consumption rate being 150 m.p.g. In addition, maintenance and repair cost less for a moped than for a car and the typical lifespan for a moped engine is 15,000 miles, or six years of use (21).[21]

[19] A 1978 survey of a nationwide random sampling of bicycle and moped dealers conducted by *Bicycle Dealer Showcase* ranked customer groups according to frequency of purchase. The groups were ranked thus: (1) men 23-35, (2) men 36-55, (3) men 14-22, (4) women 23-55, (5) men over 55, (6) women 14-22, (7) women 36-55, and (8) women over 55. However, *BDS* cautioned that "this ranking indicates who buys mopeds, not who ultimately rides them. In actual fact women probably rate higher as moped users than indicated here because many men buy mopeds for a wife or daughter." (14:38)

[20] Add-on engines with which to convert a bicycle to a power-assisted bicycle cost significantly less; mopeds with a small engine over the front wheel cost at the lower end of the range cited.

[21] These figures have been disputed. Consumer Union, in a 1978 moped safety study, reported finding 100 m.p.g. a "far more realistic expectation." (19:326) Zhenya Lane, a moped maintenance instructor at the Apple Skills Exchange in New York, asserts that he has "never seen more than ninety miles per gallon." (20:7) However, even at 90 or 100 m.p.g., the fuel consumption rate is far better than that of an economy car. This is discussed further under Environmental Desirability.

Such economy makes the moped appealing to anyone who wants to cut expenses — and who doesn't? — but especially to the commuter who travels relatively short distances to and from work, to high school and college students living on limited budgets, to families needing to invest in a second vehicle, to retired people on fixed incomes, and to people whose transportation needs are primarily within the neighborhood.

Environmental Desirability

The moped has been hailed as a low-pollution transportation alternative, a step in the right direction in our country's necessary attempts at conserving energy and resources. The Georgia Lung Association described mopeds as "tremendous energy-savers and low-level polluters with their single-cylinder, air-cooled engines."(21) Gordon Bishop, a columnist noted for his conservationist outlook, described them as "a method of transportation that can save energy, lower pollution, reduce traffic congestion, and move a person rather efficiently in city or suburban traffic . . . easier on the ears and lungs than the larger, more noxious internal combustion engines."(22)

Indeed, the Environmental Protection Agency chose not to write air pollution standards for mopeds, although its reasons for this omission are variously interpreted. Pro-moped sources ascribe the lack of standards to the moped's lack of air pollution. Bishop, for example, says that "they discharge so little fumes that EPA decided not to bother with writing up regulations for them, as they have done with some other forms of motorized transportation."(22) Consumer Union, on the other hand, had this to say about moped air pollution:

> One might think that the little moped engine is too small to be a significant source of air pollution. However, in some ways a moped engine is far "dirtier" than a modern V8 engine with 100 times the displacement. Recent tests by the Environmental Protection Agency demonstrated that, at top speed, a moped may emit considerably more unburned hydrocarbons than a car in the next lane.
>
> The EPA has set no limits on moped emissions because there are not yet enough mopeds to make a significant impact on air quality. For the same reason, EPA's proposed limits on motorcycle emissions are not nearly as stringent as the limits for automobiles. Mopeds already meet the proposed standards for motorcycles, so it seems unlikely that the EPA will move to limit moped emissions as long as mopeds are outnumbered by motorcycles. (19:326)

A 1978 California interagency task force on mopeds supported this in part, saying that "moped engines emit significantly more carbon monoxide (CO) and hydrocarbons (HC) on a per mile basis than autos, but much less oxides of nitrogen (NOX)." (15:2)

Noise pollution created by the moped is also reported to be minimal. Traveling at 25 m.p.h., the moped's 73dbA compares with the motorcycle's 84dbA and the automobile's 82dbA. Even the tiny power lawn mower surpasses the moped in noise level (8:3).

Fuel economy, discussed earlier, is also a major facet of the moped's reputation for energy conservation. The more people that use mopeds as an alternative to automobile transportation, the more fuel is saved. This, of course, does not apply to recreational uses of the moped that would otherwise be done on foot or bicycle, but increased use of the moped for short errands, for commuting to work or to mass transit that can carry one to work, or for getting to and from classes would indeed save the individual much of the cost of fuel and, to an extent, contribute to the country's conservation efforts. Consumer Union, however, points out that "commuting by moped is hardly the

solution to the energy problem. If ordinary cars carried full loads of passengers, they would be about as economical of fuel per passenger mile." (19:326)

The moped also requires far less parking space than a car. At a home or apartment, a moped requires little more space than a regular bicycle and, while in use, where local or state laws permit, it can be parked in bicycle racks. Helping to limit the space required for parking lots will at least contribute to conservation efforts in an aesthetic, if not significant, manner.

Clearly the moped, with its simplicity, economy, and environmental desirability, is an appealing and useful transportation alternative. It does, however, have a few limitations that should be noted in any accounting of its overall utility. First, it is primarily a fair weather vehicle. Most owners would not choose to operate a moped in a driving rain or in weather too cold for a bicycle. Therefore, in all but the most temperate regions of the United States, the moped cannot practically serve as a person's sole commuting vehicle on a year-round basis. Second, the moped is a short distance vehicle not particularly suited to long distance touring. The gas tank generally holds less than a gallon of gas. Furthermore, mopeds are prohibited from using interstate highways and other high-speed roads and, in the interest of safety, should also avoid other arterial routes where traffic regularly travels faster than the moped's maximum 25 or 30 m.p.h. Most errands and commuting, however, tend to fall within a 10-mile radius of home, which seems to be ideal for a moped. Third, the moped is essentially an individual vehicle and cannot be used to carry very much cargo. Many states prohibit carrying a passenger on a moped unless it is equipped with passenger seat and footrests. The inadvisability of carrying a passenger even then is discussed further under safety issues later in this report. While a briefcase or a few small parcels can be carried on a moped on a luggage rack or in a basket, even a modest load of groceries cannot.[11] Large or bulky items would be awkward and unsafe carried on a moped because they would tend to protrude from the vehicle (and strike or be struck by other objects) and throw it off balance. Many state laws prohibit a moped operator from carrying anything in the hand or under the arm; whether prohibited or not, this practice should be avoided for safety reasons.

With these limitations in mind, the moped still has much to recommend it in terms of appeal and utility. But what about safety?

[11] Three-wheeled mopeds can be purchased with large grocery racks in back. These, however, are reported to have more limitations in other respects than the two-wheeled variety and would tend to be a practical choice only for someone intending to use them for short-distance transporting of groceries or other items.

Safety

The safety issues that have arisen with the advent of the moped in America revolve around three major aspects of moped use: the operator, the vehicle, and the environment or situation within which the vehicle is operated. Each of these broad areas encompasses a number of specific safety issues about which various people and organizations have found much to dispute. The following discussion is an attempt to provide an overview and analysis of the many facts, opinions, hypotheses, and legislative mandates regarding these issues.

The Operator

The moped operator is perhaps the most elusive variable in the moped safety situation, at least in terms of identifying and documenting the problems. It is difficult to isolate the human causal factors at work in moped safety problems and to document their existence and extent of impact. But once identified, those factors may be addressed through licensing regulations, consumer and driver education, and law enforcement. The overall operator problem is, in short, the young or inexperienced, untrained, overconfident operator who drives a moped in a manner that is unsafe to him- or herself and to others. A problem with so many facets cannot, of course, be addressed through a single strategy; rather, attention must be given to the various facets of the problem.

Youth and Inexperience. While overall moped ridership in America represents all age groups from teens to retirement, statistics are beginning to show that, at least in some areas, young drivers make up a disproportionate percentage of that ridership. Authorities in the state of California (where moped use is the highest in the country), for example, have found that with an estimated 35,000 to 50,000 mopeds in use, the operators are predominantly young. In 1977, 61% of the moped accidents in California involved operators who were 19 years old or younger (15:2). Michael Evans, in a 1977 survey of 100 moped operators in southern California, found an average age of 17 years and length of ownership of 4.7 months (23:27 and 48; 24:4).[11]

While the high proportion of young moped operators in California might not fully reflect the situation in the rest of the country, the fact remains that in the majority of states a moped license is available to 16-year-olds and in some states to 12-, 13-, 14-, or 15-year-olds.

The Moped Association of America, in fact, advocates laws permitting moped use by 14- to 16-year-olds. Referring to the moped as "an inherently safe vehicle because its maximum speed is regulated by state law, its safety equipment . . . is strictly mandated by the Federal Department of Transportation, and its operation is relatively simple," (29:1) the MAA makes these recommendations:

> A driver's license should not be necessary. However, if a driver's license is to be required, ***any*** valid license, e.g., an automobile license, should be sufficient. Also, if a driver's license is to be required, it is recommended that the law provide for a motorized bicycle license, which

[11] This finding of young and inexperienced operators should be considered with caution, as it appears that a survey methodology (locating moped operators from street corners in a particular area) could have biased the sample if the location was one frequented more by young people than by others.

may be obtained at age 14 or 15, by passage of the written rules of the road part of the automobile driver's test, only. Given the simplicity of operation of a motorized bicycle, there is no reason to require a separate road test for the operator (8:5).

Manufacturers, as well, encourage the young to ride mopeds by directing a portion of their marketing campaigns toward them and depicting the moped as fun to ride, in style, and easy to operate.

Illustration frequently used in *Moped Magazine.*

Paul Zimmerman, executive director of MAA, further suggests that "the dealer must assure that the purchaser understands all the moped controls and equipment, and how to operate his machine before leaving the retail outlet. The operator must drive defensively and within the limits of his vehicle." (29:1) Serge Seguin, also of MAA, ascribes the responsibility for education and skill to the individual rather than to the state, stating that "once educated about the inherent safety of the motorized bicycle, the rider must assume responsibility for its safe use." (30)

The contention among these advocates of relaxed moped licensing seems to be that, because the machine is easy to operate and slow, anyone over 14 should be able to ride it in traffic.

But traffic safety authorities generally agree that the ***learning period is the period of greatest error and that the highest incidence of accidents occurs among youthful, inexperienced drivers.*** A number of authorities, moreover, feel that these facts are especially applicable to moped operators. Because of the very simplicity and ease of operation cited by promoters of the moped, safety spokespersons feel that operators tend to become overconfident about their ability to handle the machine or about the capacity of the machine itself. Combine this with youth, inexperience, lack of knowledge of defensive driving techniques, lack of skill, or insufficient power of the machine to avoid or escape a hazard (discussed later), and the driver may find him- or herself in difficult situations.

In most states, the inexperienced and unskilled moped operator has free access to the road because no proof of driver education, moped training, or acquired skill is required of the moped license applicant. Where driver education is required of young applicants for automobile operator's licenses, such education may not be available to many 12- to 16-year-olds and, where available, applies to automobiles and not mopeds. Very little has been done in moped-specific driver education to date. While the knowledge of traffic laws gained in driver education will undoubtedly be useful to the moped operators who do participate in driver education, the required skills and the risks encountered by the operator of a two-wheeled vehicle are quite different. To compound the problem, only one state (New Jersey) requires a road test ***on a moped*** for a moped license. In other words, most states permit a teen-ager, upon passing a written test on rules and signs and, perhaps, an automobile road test, to climb upon a moped and

compete with motor vehicle traffic. No attempt is made to determine whether the applicant really can operate the moped in traffic.

In considering the advisability of relaxed laws for the operationally simple moped, perhaps a distinction needs to be made between the ability to operate the controls of a moped (which admittedly is quite simple) and the ability to compete with 2,000- to 4,000-lb. cars moving at faster speeds than those of which the moped is capable. Kenneth Licht of the National Safety Council described the situation this way:

> Unfortunately, errors in traffic can be fatal, and if mopeds appeal to the teen-ager we can expect some serious traffic problems as more and more mopeds move into traffic. Although it is easy to learn to operate a moped, it's not easy to learn how to drive one ***safely***. Inexperience, combined with the natural exuberance and feeling of immortality inherent in youngsters, can be expected to produce a rash of moped collisions and spills. Moreover, permitting youngsters to move into the traffic flow with no training or even an examination to determine if they know how to operate their machine, strikes me as an abnegation of responsibility on the part of adult society (25:6-7).

The 1977 moped accident statistics in California tend to support this concern: not only were 61% of the accident-involved moped operators young, but in 49% of the accidents the moped operator was at fault (15:2). There is no way of knowing what additional portion of the accidents could have been avoided by better defensive driving techniques or awareness of potential traffic hazards for the moped.

Borrowers present a special problem in terms of inexperience. Patricia Barry, in a study comparing motorcycle crashes involving owners with crashes involving borrowers, found that "the discrepancy between the percentage of crashes attributable to borrowers and their relative mileage exposure is a nine-fold difference. The borrower's risk of crash appears to be very high indeed." She goes on to conclude that "inexperience greatly increases the hazard of motorcycle riding; any effort to reduce the high crash rate of motorcycles should include a program designed to limit the number of inexperienced motorcyclists on public roads." (26:238) While these findings relate to motorcycles, it is not difficult to see their applicability to mopeds. Evans, in his survey of moped owners, found that "the average total number of borrowers per moped was about 10.3." (27:10)

If predictions of increased accident involvement among young and inexperienced operators continue to be borne out, it is clear that further attention will need to be given to minimum operator ages and to the education and screening of potential operators. The efficacy of tighter requirements in such areas has been shown in a 1973 study of motorcycle and moped accidents by O'Mara, in which it was found that an "increase in legal requirements for the testing and licensing of motorcycle operators" (including mopeds) contributed to an abrupt decrease in motorcycle and moped fatalities between 1967 and 1969 (31:9).

Incompetent Operators. Inexperience, of course, is not confined to the young, and lack of skill is not confined to the inexperienced. A person of any age — even a skillful automobile driver — may be an incompetent operator of a two-wheeled vehicle. Since many states permit holders of driver's licenses to operate a moped without further requirement, a person who earned a driver's license 20 or 30 years ago can simply hop on a moped and join the traffic flow. In states where no license (or no road test) is required, an incompetent driver who has lost his or her driver's license can operate a

moped. The person who can't afford to drive a car because of high insurance rates resulting from a poor driving record can also drive a moped in many states. (Of the 37 moped states, 24 have no requirement for insurance of any kind and nine require only proof of financial responsibility.)

Lack of stringent licensing laws — especially lack of a moped skill test before licensing — may allow incompetent drivers on the road. According to Richard L. Tippie of the National Safety Council,

> licensing officials generally agree that the basic function of motor vehicle operator licensing is to identify the applicant who may be incompetent to operate a vehicle safely. Physical inadequacies, emotional or mental aberrations, or simple ignorance may make the applicant a potential hazard to himself and others, and in need of remedial action before a license is granted. When the licensing procedure is abandoned or made irrelevant (for example, driving a car is not the same as driving a moped) the opportunity to assist the individual who may not himself realize his deficiencies, may be lost forever. And safety may suffer (28:7).

A number of states have attempted to educate moped riders by distributing handbooks, pamphlets, and other material on safe driving practices.[24] While this effort is certainly well placed, it remains to be seen whether this approach (perhaps coupled with dealer instruction in machine operation) suffices in preparing the young, the inexperienced, or the incompetent driver.

Unsafe Riding Practices. A major problem that has been cited regarding moped operators (and one which probably stems directly from youth, inexperience, lack of moped education, and overconfidence) is unsafe riding practices. One such practice is ***improper signalling.*** Evans found that 65% of his respondents turned "often" or "occasionally" without signalling. The 1977 California moped accident statistics revealed that 36% of the accidents involved improper turns and right-of-way on the part of the moped operator (15). Improper signalling may be attributed either to careless driving habits or to the handbrake placement, which is discussed later. Whatever the cause, the result of this practice is a very dangerous situation for the rider. Because the moped is not easily seen by automobile drivers, is unfamiliar to many of them, and is vulnerable because of exposure of the operator and size difference of the vehicles, the moped operator can ill afford to do the unexpected in traffic. Additional unsafe practices noted by Evans, which are likely to be illegal in most areas, are failing to come to a complete stop at stop signs (61% often or occasionally), taking short cuts through gas stations or parking lots to avoid intersections (60%), and riding on sidewalks (27%).

Another unsafe practice of moped operators is ***misuse of the brakes*** — especially using the front brake alone. Consumer Union, in discussing its safety analysis of moped brakes, reported that

> many experienced cyclists use a conservative braking technique, relying, in normal driving, primarily on the rear brake, even though the front brake usually has much more stopping power. That's because a rear-wheel skid can often be controlled without a fall; a front-wheel skid is usually step one of an accident . . . Although we used the front brake alone in this [portion of the] test, it's a practice that moped drivers should avoid. If a front wheel skids, steering control is lost and the driver is in the hands of inflexible physical laws (19:324).

[24] See references 32 through 38.

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Not only is the use of front brake alone ill advised, but use of either brake alone does not provide the stopping power of two brakes used together. According to the Federal Motor Vehicle Safety Standards, the braking distance from a 25 m.p.h. speed using both brakes is 37 feet; using one brake, braking distance increases to 84 feet (24:5). Evans, however, reported that 16% of his respondents normally do not use both of the brakes. Furthermore, given two questions on the proper use of brakes, only 58% and 50%, respectively, of the respondents answered correctly, indicating inadequacy of knowledge (and possibly of instruction) in the use of moped controls.

Some moped operators, once the motor is engaged, ride with their ***feet on the center support*** section of the moped instead of on the pedals. Evans reported 37% of the respondents assume this position (24:5). There are two problems with this practice. First, the pedals on a moped, if not kept in place by the operator's feet, tend to move around. If a turn is made when the "inside" pedal is down, the pedal can catch on the ground and cause an accident. Second, keeping feet on the pedals permits the driver to lift off the seat slightly when riding on rough surfaces and to absorb the jostling through his or her legs, thus maintaining a steadier balance. If this is tried with the feet on a narrow center support, the feet can slip off and cause the operator to lose control.

Evans also reported that 58% of the respondents ***carry passengers*** occasionally or often. Many states permit this only if the vehicle was originally designed to carry a passenger — that is, if the moped is equipped with a seat and footrests for the passenger. Consumer Union, however, advises against carrying passengers under any circumstances. They tested several moped models with operators of various weights — 125 lbs., 175 lbs., and 225 lbs. Their results were these:

> With the lightest weight and on level ground, only three . . . were judged able to keep pace with normally accelerating traffic. When we upped the rider weight to 175 pounds, only [one] still had a good chance of keeping up. With 225 pounds aboard, all the mopeds would be impediments to traffic, in our judgment. The worst of them would be serious impediments. When we transferred our acceleration tests to a hill with about a 7 percent grade, we ended up with a lot of little engines that just couldn't (19:320).

One can easily see that two 100-lb. people on a moped would encounter similar conditions. Overloading a moped also reduces the effectiveness of the brakes, interferes with the suspension system, and causes it to deteriorate over time. This subjects the operator to more jostling on bumpy roads and potential loss of control. CU's conclusion was this: "Don't carry passengers. Even though motorcycle-type saddles with room for two are available, moped frames, wheels and tires aren't made to bear the extra weight. And an overloaded moped doesn't accelerate properly." (19:323)

Carrying parcels under the arm or in the hand, although prohibited in many states, also seems to be a fairly common practice (53% in Evans' study). The danger in this behavior is clear: a hand occupied for anything other than driving reduces the operator's control of the vehicle and makes signalling extremely awkward. The baskets and luggage racks that are available as basic equipment or accessories should make this practice quite unnecessary.

Riding in unsafe areas of the road is a practice that, to an extent, is fostered by the state laws themselves. Many states require that mopeds keep to the far right or drive on the shoulder. However, riding on shoulders is dangerous because of broken glass, debris, potholes, grates, and loose gravel. Riding on the far right poses these additional

hazards: parked cars, car doors being opened in the path of the moped, puddles that can dampen brakes and hide potholes, and slippery wet leaves. State laws vary with respect to mopeds' rights to a full traffic lane: some permit them to drive two-abreast in a lane and others dictate single file to the right. Riding two-abreast can make automobile drivers — especially those who are intolerant of two-wheelers in traffic — impatient, in which case they may tailgate the moped or, in passing, force the moped over by cutting in too closely.

The subject of mandatory ***protective clothing*** — especially helmets — is as controversial for moped operators as for motorcyclists. Of all the moped states, only New York requires helmets for moped operators, and then only for mopeds capable of speeds over 20 m.p.h. Perhaps this absence of helmet laws is not surprising in light of the trend toward repeal of state helmet laws governing motorcyclists. However, some states have even more lax helmet laws for moped operators than for motorcyclists. For example, in Ohio, where the motorcycle helmet law has been revised and now applies only to operators and passengers under 18 and novices, helmets are not required for any moped operators, whether young, adult, novice, or experienced.

Although a number of states — including Ohio — recommend (without requiring) that moped operators wear helmets, there is every indication that the recommendation is ignored by most moped operators. Evans found that 97% of the respondents did not regularly wear helmets (27:10). Casual observation, while a fallible methodology, readily supports this kind of finding: very few moped operators can be seen on the roads wearing helmets.

These personal choices not to wear helmets and the state laws that permit this choice contradict what accident studies have revealed about helmet use. Buchanan, Biscoff, and Richardson, in analyzing helmet effectiveness at speeds below 35 m.p.h., have stated that "unhelmeted riders appear to be about seven times more likely to receive a fatal head injury in a crash than are helmeted riders." (39:10) Severy, Brink, and Blaisdell (41) pointed out in "Motorcycle Collision Experiments" that "the size of the vehicle on which a rider is mounted makes little difference in the way he will be injured in a collision accident." Langwieder (16) found that operators of mopeds and motorcycles involved in accidents have almost identical risk of injury and that the lower speed of the moped does ***not*** reduce injury risk. He also found that, most often, injuries resulted from the operator being thrown by the impact of the collision and striking the ground, the vehicle, or another object. In the case of mopeds, the trajectory of the thrown operator is often changed by striking the car, increasing the risk of serious injury 1½-fold and fatal injury fourfold. Citing his own findings that "the risk of serious head injuries is double, and of critical and fatal injuries three times as high for drivers without helmets than for drivers wearing helmets" and similar findings by Hight, Siegel, and Nahum (40), Langwieder concluded that

> notwithstanding all other safety devices, the use of safety helmets represents the main decisive safety measure for motor-cyclists and moped drivers . . . An extension of the regulations governing the compulsory wearing of helmets for motor-cyclists and moped drivers therefore constitutes a major safety demand (16:297-298).

Indeed, as Consumer Union points out, "both Great Britain and France, which instituted helmet laws in the early 70's, report a reduction of about one-third in serious head injuries to moped operators. That parallels U.S. experience with helmet use by motorcycle drivers." (19:322)

Notwithstanding these findings, the MAA has campaigned against mandatory use of helmets and has not urged moped operators to wear them. MAA's Zimmerman points out that ". . . the simplicity of operation plus the safety equipment and the low speed leads us to the conclusion that helmets should not be mandated. Some people will wish to wear them, just as some bicyclists wish to wear helmets." (20:10) Seguin, also of MAA and representing Motobecane, likewise has stated that "we do not think that helmets should be mandatory for a moped rider. On the other side, if a rider feels like wearing a helmet, we have no opposition to a moped rider wearing a helmet." (5:6)

Others, however, disagree. Licht of the National Safety Council, for instance, has stated, "Of course, there's no question about that as far as we're concerned. A helmet, we feel, ought to be required." (20:9) Buchanan of the NHTSA questions "whether the states have perhaps moved too quickly with this legislation, and whether deaths and serious injuries will occur needlessly because of . . . failure of legislators to provide for safety helmet use." (42:8) Consumer Union described state-required use of a safety helmet as "an absolute necessity on vehicles of this type." (19:322)

Still others interested in the safety of moped operators, while not advocating mandated helmet use, strongly urge operators to wear helmets. *Moped World* magazine, for example, has stated that they "would like to encourage all mopedders everywhere to use a safety helmet. As opposed to a mandatory helmet requirement, we would rather see mopedders use their heads for something more useful than asphalt impact testing." (43:12)

Despite the apparent weight of findings and opinions about the advisability of helmet use, it seems unlikely that the present trend away from mandatory use will be reversed. However, if moped accident statistics in America support the helmet's favorable impact on injury and death rates, and moped operators are sufficiently informed of this, they may assume the responsibility of wearing helmets.

Another unsafe practice found among moped operators relates to the ***lack of other protective clothing*** — for feet, legs, arms, and eyes. Evans reported that 56% of the respondents rode barefoot occasionally or often (23:35). This can subject the operator to abrasions on turns, foot injuries in spills, catching of toes in the spokes, and — in all of these situations — loss of control of the vehicle if the foot is injured. Long pants were worn only occasionally or never by 34% of the respondents. (Arm protection was not reported and response about eye protection was inconclusive.) This lack of protective clothing is not surprising, considering that much of the advertising for mopeds shows operators dressed in short pants, short skirts, and even bathing suits. Lack of protection on the limbs subjects one to stings from insects, bruises from small flying objects, loss of control if these injuries occur, and increased abrasion in case of a spill. Seventy percent wore bright clothes only occasionally or never despite the fact that bright colors can help increase rider visibility.

Unsafe riding practices may be attributable to lack of knowledge about moped operation or traffic safety, careless disregard of known safety principles, or youth (it is difficult to picture, for example, a mid-life commuter on route to work or a retiree riding his or her moped barefoot). It follows that riding practices could be improved through moped driver education courses, improved dealer-to-buyer instruction, tougher moped laws regarding minimum age and protective clothing, and stricter enforcement of traffic laws and ordinances.

The Vehicle

Construction of the moped according to safety standards is carefully regulated by the federal government. According to MAA, this and the vehicle's simplicity and low power make the moped "an inherently safe vehicle." (29:1) There are those who strongly disagree, however, and some who feel that the very design characteristics that have been associated with safety do, in fact, contribute to the moped's ***lack*** of safety. These characteristics are discussed in the pages that follow.

Lack of power. The most frequently discussed vehicle safety issue is the low power of the moped. Serge Seguin, of Motobecane and the MAA, says "a motorized bicycle is engineered to be ridden at low speeds, a fact which automatically diminishes the risk and severity of accidents." (30:1) But Kenneth Licht of NSC describes the situation thus:

> Another safety concern is low power — a characteristic often considered one of moped's advantages. Limited by law to a maximum speed of 30 mph (20 in some states), the little one-lung engine . . . strains to accelerate with the normal flow of traffic and may find it impossible to keep up with other vehicles. Traffic is most efficient (safest) when moving at a steady tempo. Deviations from this tempo — either faster or slower — tend to cause conflict and produce collisions. Traffic experts are concerned that the moped may disrupt the traffic flow and thus become a hazard (28:7-8).

Elaborating on this problem, Licht states that:

> the low power of the moped may make it impossible to escape trouble by a quick burst of acceleration. I suspect most of us have had the experience of "tramping on it" to avoid a potential collision. Well, unfortunately, there's nothing to "tramp on" with a moped (25:6).

Consumer Union also addressed this characteristic of the moped:

> With only 2 hp or less on tap, the acceleration of a moped is, not surprisingly, on the anemic side — a little too anemic, we felt. In order to mix in well with city traffic, a moped ought to be able to pull away from a stoplight with the herd. Otherwise, impatient motorists will crowd the tail of the moped and try to pull around it, creating dangerous situations (19:320).

Mopeds are prohibited from high-speed, limited access highways in most states by virtue of their maximum speeds. However, in most states they are still permitted on arterial routes with no minimum speed limit, where traffic may be moving as fast as 40 or 45 m.p.h. This kind of road (and, in fact, almost any uphill grade) is where the greatest danger of uneven traffic mix exists.

To complicate this situation, the mere presence of a motor can create an ***illusion*** of power. A person on a pedal bicycle knows his or her vehicle is only as fast as human legs can move it and will tend to avoid dangerous situations that would require power to escape. A moped operator thinking of the machine as powered, however, is more likely to get into traffic situations that require faster acceleration to escape than the moped is capable of producing. Combine this illusion of power with inexperience or lack of driving skill, and the potential for an accident is high.

A related issue is that of the moped's ***position in the traffic flow.*** As has already been discussed, some states regulate the moped to the far right lane or the shoulder, which presents its own hazards. State laws differ as to whether mopeds may use bicycle lanes

(within or adjacent to roadways) and paths (separate from roadways) wherever they are available. Even safety authorities seem to waver on this point. Buchanan (44) points to the favorable results in Europe of separating bicycle traffic from motor vehicle traffic and posits that similar separation of motorcycle traffic would also produce favorable safety results. This view would logically include mopeds as well. Licht, despite his warnings about the dangers of the uneven traffic mix, personally dislikes the prospect of mopeds in bicycle lanes: "As a bicyclist at heart, I would have some reservations about sharing a portion of the roadway as a bicyclist with a moped operator. So in my estimation the moped belongs with the flow of traffic . . ." (20:10) But he also cites the favorable European experience in separating mopeds and bicycles from four-wheel traffic and concludes that "the conflict with automobiles is virtually eliminated when two-wheelers use facilities banned to automobiles." (25:5)

Whether or not one favors use of bicycle facilities by mopeds, at this point the issue is largely academic because, as Licht goes on to point out, "there are virtually no facilities for bicycles and mopeds to share in this country, so they'll be on the streets and highways with all the other trucks, buses, and automobiles." (25:5)

Low Visibility. Severy, Brink, and Blaisdell found that

> auto-motorcycle collisions are frequently caused by a reasonably attentive motorist failing to notice in time the approach of the relatively small sized motorcycle, representing with its rider one-quarter the size of a passenger vehicle (41:113).

The ***small size*** of the moped (smaller even than a bicycle) makes it even less conspicuous than a motorcycle. Licht has repeatedly pointed to low visibility as a safety problem for the moped operator:

> If the moped operator positions himself in the lane of traffic with an automobile in front of him and an automobile behind him his visibility — or his conspicuity, if you will — is just about eliminated, and someone trying to pull into that space may well collide with the moped operator (20:10).

Licht foresees that "motorists have to get used to sharing the roadway with mopeds" and that "mopedalists will quickly have to learn to constantly surround themselves with a large space cushion." (25:6) It is commonly recommended — by state departments of highway safety, moped associations and publications, safety authorities, and others — that moped operators additionally do everything they can to make themselves seen and heard (choose a bright colored moped; wear bright clothing; use flags, reflectors, and lights;[25] and use the horn) and think of themselves as invisible to other drivers. This calls for continual scanning to anticipate hazards before they occur and maintaining that "cushion of space" — leaving oneself plenty of room to stop or steer out of danger.

Design aspects of the vehicle itself about which the operator can do little, however, tend to contribute to the moped's problem of visibility. Consider, for example, ***the horn.*** Safety spokespersons advise using the horn well before a real emergency exists. While this is good advice, it might be better not really to depend on the horn at all because, according to Consumer Union and others, it is poorly suited to compete with the noise level of running engines and moving traffic:

[25] Few states require daytime use of lights.

> Mopeds have little buzzers instead of horns. We found the buzzers ridiculously inadequate. When the engine speed is up, or when the headlight or stoplight is on, the buzzers can manage no more than a useless little bleat. More's the pity. A vehicle like a moped must be driven defensively, and one element of that defense should be a good loud horn (19:320).

CU's test included a dozen "top-of-the-line models" from different manufacturers, both domestic and foreign. Although unrepresented models might have louder horns, one could expect CU's findings to be generally representative. A moped owner would do well to evaluate the adequacy of the factory-installed horn and, perhaps, supplement it with a louder device.

Another design problem related to visibility involves ***the lights.*** By federal standards, each moped must have a headlight and a combination stoplight-taillight, but is not required to have turn signals. By design, moped lights are powered by an engine magneto, not a battery. Because of this, the power varies with the speed of the vehicle: at top speed the lights are at their brightest; at low speeds they are considerably dimmer; and if the engine stalls — and this is a situation when an operator might need lights the most — the lights go out. The same applies to the horn, which receives its power from the same source. This design has been pointed to as a defective safety feature by Consumer Union (19:320), Zhenya Lane (20:5), Lagerroos (45:3), and others. It has been suggested that the moped owner could add a "battery which operates on a trickle charge connected to the magneto . . . to help keep the lights at full strength." (45:3)

Turn signals were eliminated as a requirement for mopeds in a 1974 decision by the NHTSA. This decision may have been influenced by petitioners' (see "History of the Moped, United States" in this report) arguments that

> the pedal bicycle concept requires that the rider use hand signals for turning, and this universally is the case with the power-assisted bicycle. Turn signals are structurally inappropriate for the power-assisted bicycle because they unnaturally protrude from the longitudinal axis, and thus may be easily broken when the vehicle falls or is placed against a wall.

The NHTSA responded that they had determined that

> in view of the speed and weight characteristics of motor-driven cycles, the problems associated with hand signalling and the lack of turn signal lamps are not as significant as they are with the larger motorcycles (3:13287)

and chose to delete the standard. The advisability of this deletion has been questioned because the absence of flashing turn signal lamps further contributes to the low visibility of the moped that already results from its small size, variable intensity lights, and inadequate horn. Furthermore, the absence of turn signals requires that the operator remove a hand from the handlebars in order to signal a turn, a situation that aggravates the problem of brake design, which is described in the section that follows.

Evans (27:10) advocates reverting to the old FMVSS requirement; Consumer Union concurs:

> We disagree with the exemption for two reasons: light signals are far more visible than hand signals, especially at night; and hand signals require one-handed driving, which is uncertain at best and downright hazardous over road irregularities. Unfortunately, turn signals demand more current than our moped magnetos can reliably supply. The only alternative we know of are turn-signal kits that include rechargeable batteries . . . we feel they're worth the money and the search for those anticipating travel in city traffic (19:320).

Brake design. The frequency and the inadvisability of using one brake instead of two and the absence of turn signals, which were discussed earlier, enter into one problem of brake design — that of brake control placement. Mopeds have drum brakes operated by hand controls located on the handlebars. As mandated by federal safety standards, the control for the rear brake is located on the left handlebar and the control for the front brake on the right — the opposite of the placement on most bicycles. This poses what several authorities view as a significant safety problem. Since mopeds do not have automatic turn signals, the operator must signal intended turns by hand; with one hand being used for signaling, the operator is forced into one-handed braking, which is not the most efficient or the safest braking practice. Since the only hand available for operating brakes while approaching or making turns is the right one, the operator is forced to use the front brake to slow for the turn. This can be dangerous, especially if much pressure is applied, because it can cause a skid or throw the operator forward. Or, as Evans pointed out, it may cause some operators to dispense with hand signals altogether in order to use both hands to steer and brake — also a dangerous practice.

Furthermore, Licht has pointed out (25:8) that most bicyclists whose rear brake is normally on the right handlebar develop the habit of applying the rear brake first in preparation for a two-brake stop. This practice will have to be unlearned by the bicyclist/moped operator in order to avoid unexpected front-wheel stops and skids.

Evans, as noted, suggests reverting to the old FMVSS standard which required automatic turn signals, allowing the operator simultaneously to signal and perform a two-handed braking and turn. Licht (25:8) suggests reversal of the placement of the two brake mechanisms.

Consumer Union found an additional problem related to brakes: ***variable effectiveness.*** On each model tested, CU tested rear brake alone, front brake alone, and both brakes in combination. Using rear brakes alone, results varied from "very good" (30 ft. to stop a moped going 20 m.p.h.) to "decidedly poor" (more than 50 ft. at the same speed). CU noted that they "consider feeble stopping power in rear brakes a very serious shortcoming because it means that the front brakes must be relied on for normal stopping — a particular hazard in slippery conditions."

Using front brakes alone, the results, again, varied among models from "a well-controlled stop within 20 feet" to those that "plowed on for 40 feet or more, even though the front brake lever had pulled all the way back to its limit."

Using both brakes together, most mopeds could be brought easily to "quick, sure stops." Says CU, "that's a deceptive finding . . . because it greatly narrows the range of differences we found in the separate front and rear brake tests. Mopeds that routinely require the use of both brakes in ordinary driving are undesirable in our view . . . ." (19:324)

All this seems to suggest that purchasers should thoroughly investigate the efficiency of each brake on any moped model they are considering, and test the moped's stopping power under various conditions (smooth macadam, rough surfaces, rain, gravel, and so on).

Other design factors. Other features of the moped's design that bear mentioning in relation to safety are, for the most part, either inherent in any two-wheeled vehicle or not present across all moped models.

For example, the moped is subject to the inherent ***instability*** of any two-wheeler on a less-than-ideal surface. Control is affected by wind and by such surface hazards as oil, gravel, wet leaves, roughness, and potholes; the stronger the wind or the rougher or more slippery the surface, the less stable the ride. Controlling a moped is an all-or-nothing proposition: whereas the driver of a car can often regain control without significant problems after encountering a bad surface, a two-wheeler falls over when balance is lost.

The moped operator is subject to greater ***exposure*** (to cars, to flying objects, and to the ground in the case of a spill) and does not even have the advantages of safety restraints — all the more reason to take full advantage of safety helmets and other protective clothing! Combine instability or exposure to any of the other safety factors that have been discussed (low visibility, lack of power, and so on) and the danger is multiplied.

According to Consumer Union, mopeds have ***variable handling*** characteristics among models. Using the criteria that "a good-handling moped moves through maneuvers predictably and nimbly and with very subtle control forces, the rider should sense an easy balance, with no vagueness or uncertainty." (19:321) CU encountered varying results testing the mopeds at low and high speeds, on smooth and gravelly surfaces. More variation was found among the models in full-throttle tests than in low-speed tests. Noting that the moped generally "reaches its traction limits all too easily," CU found that in a skid situation "some mopeds seemed fairly predictable and forgiving while others made greater demands on the driver's skill." (19:322) These variations are hardly surprising, given the quality differences generally found among different models of ***any*** product. They do, however, call for careful test driving of any moped model considered for purchase.

Mopeds with ***long "buddy seats"*** tend to invite the carrying of passengers which, as discussed earlier, is detrimental to acceleration and should be avoided. A comfortable seat for the operator, however, is considered important by CU because of the type of suspension used on many mopeds and its effects on stability.

Many moped models (all but the deluxe lines) have no real ***suspension*** in the front: the fork is simply bolted to the wheel. Even those with front suspension that ***looks*** like the hydraulic suspension of motorcycles actually have only a spring type of suspension. Poor suspension causes the vehicle and rider to jiggle unreasonably on rough surfaces. Jiggling can affect the operator's vision, reduce his or her control of the vehicle, and cause the operator to focus his or her attention on the road surface (in order to avoid bumps and potholes) instead of on traffic. This, of course, puts the moped operator in a very vulnerable position. The new moped purchaser would do well to invest in a model with good spring suspension and a "thickly, but firmly, padded and shaped"

seat, the springs of which "should not bottom out on bumps" and which "should not deform uncomfortably under the weight of a heavy rider." (19:326)

The Environment

In addition to the safety concerns related to the capabilities of the person operating the moped and the design and performance characteristics of the vehicle itself, another potentially hazardous situation exists: that of the environment in which the moped is operated.

The safety problems related to the small size, resulting low visibility, and vulnerability of the moped in competition with the automobiles that make up most of the traffic stream have been discussed, and these certainly are a part of the moped's traffic environment. The hazards of tempo fluctuations in the traffic mix have been cited by Licht and others as a major problem in the traffic environment. Exposure of the rider to weather, flying objects, wind, other vehicles, and other elements and the instability of the vehicle when it encounters certain weather related conditions are additional environmental hazards faced by the moped operator. (See "The Vehicle," preceding this section, for discussion of these potential hazards.)

One aspect of the environment which remains to be studied in this report — and one which plays a very important role in the safety of the moped — is the motorist. Because of the size and power differences between mopeds and cars, the moped operator is especially vulnerable to any hazards created by the motorist. There are two main facets of this problem: awareness and attitude.

Motorists' awareness. American motorists are far less accustomed than are Europeans to sharing the road with two-wheeled vehicles as small as the moped. Mopeds are easily lost in motorists' blind spots and are likely to be "cut off" in traffic or forced over onto the berm, albeit unintentionally. Often, motorists who are generally alert to vehicles and actions around them fail to see mopeds because they are scanning for cars, not small vehicles, and simply don't see the unexpected. This is one of the most frequent causes of moped-automobile collisions. As described in "Motorcycle Collision Experiments,"

> auto-motorcycle collisions are frequently caused by a reasonably attentive motorist failing to notice in time the approach of the relatively small sized motorcycle, representing with its rider one-quarter the size of a passenger vehicle (41:113).

This type of situation is also noted with reference to mopeds by Licht (25:4), Lagerroos (45:4), and the Moped Owners Association (46:9). According to Licht and others, this calls for "education of the motorist" with regard to sharing the road with small, two-wheeled vehicles and for constant vigilance on the part of the moped operator.

Motorists' attitudes. As is often stated in safety literature, "the right of way is something you have to give to others but never have yourself." This is especially true for the operator of a small, low-powered, inconspicuous moped. Not only are motorists often unaware of a moped's presence in traffic, but some are actually hostile to small, slow vehicles and do not regard them as having full rights to the roadway. They become impatient or angry when held up by slower vehicles and sometimes behave dangerously toward them — tailgating, approaching from behind and blasting their horns,

brushing by them without sufficient clearance, forcing them off the road, pulling out into their path, and so on.

This kind of behavior, too, is a sign that motorist education is needed. But attitude change takes time; in the meantime, moped operators must be among the most defensive drivers on the road. Licht talked about "leaving a large cushion of space" all around the moped. Others advise that the moped operator do everything possible to be conspicuous and then think of him- or herself as invisible to motorists and avoid any situations that would require being seen or treated responsibly by the motorist. Continual scanning of the traffic situation is a must for the moped operator.

These and other defensive driving techniques are, of course, a main ingredient of driver education programs, which moped license applicants are not required to have taken in many states. Moped operators everywhere would benefit from moped driver education to equip them with the knowledge and skills needed to survive in an "unforgiving" and sometimes hostile traffic world. Whether mandated by state laws or not (and many think they should be), such courses should at least be made available to moped owners and operators.

Additional safety precautions for the moped operator are presented in the section that follows.

Safety Tips for Moped Operators

The following safety tips have been suggested for moped operators by a variety of sources: the many safety authorities cited in this report, the Moped Association of America, moped periodicals, state departments of highway safety, and others. Responsible moped operators should, at the very least, arm themselves with these few defenses to help make "mopedding" a safe and pleasurable experience.

1. Buy a moped with adequate safety features: maximum acceleration, efficient front and rear brakes, front and rear shock absorbers, trickle charge battery to provide supplemental power for horn and lights, quality construction, two mirrors, as loud a horn as can be obtained, turn signals if available, package carrier, and a bright color finish. Never alter a moped engine.

2. Get thorough instruction (from dealer, school, or other sources), both in operating the controls and in coping with traffic. Know all the state and local laws and road rules.

3. Practice in off-street areas. Begin on-street driving in light traffic areas and gradually work up to more heavily traveled roads. Don't tackle roads with speeds your moped can't handle.

4. Wear a helmet, eye protection, and other protective clothing (shoes, long pants and sleeves). Never wear clothing that can tangle in moving parts.

5. Run a safety check on your moped before riding, including brakes, steering, lights, horn, tire pressure, and acceleration.

6. Be conspicuous: wear bright colors, turn lights on day and night, and use a bike flag.

7. Avoid dangerous areas. Don't ride too close to the center or the curb. Watch for parked cars, gravel, grease, potholes, grates, tracks, wet leaves, and debris. Don't ride on shoulders.

8. Keep a large "space cushion" between you and other traffic; continually scan; drive defensively. Continually check the rear view mirror.

9. Watch for opening car doors, cars leaving parking places, buses leaving or approaching curbs, pedestrians, animals, vehicles pulling out of driveways and parking lots.

10. Remember you may not be heard; pretend you can't be seen either. Don't depend on your horn for warning cars. Don't depend on other drivers seeing you.

11. "Give" the right of way to all cars.

12. Always obey all rules of the road. Avoid riding to the right of stopped traffic, especially approaching intersections where cars may be turning right.

13. Learn not to engage the front brake alone during a turn. Slow down well in advance of a turn. Learn to use both brakes for maximum efficiency.

14. Keep both feet on the pedals, not on the frame. Pedals move around and can hit the ground when you are banking into a turn.

15. Use hand signals and verbal signals plus directionals if you have them.

16. Never carry passengers unless the moped is specifically built for it. Even then, carrying passengers hampers the acceleration and braking power of the moped and should be avoided. Passengers should ***never*** put their feet on the pedals.

17. Don't plug a radio into your ear.

18. Don't carry packages under your arm, attached to your arm (for example, the handles of a book bag), or in your hand.

19. Ride single file.

20. Drive responsibly. Don't stunt drive or show off.

21. Don't try to pass other vehicles unless it is totally safe. Don't hop curbs or other obstacles.

22. Don't try to outrun a chasing animal; it can probably catch you. If the animal persists, get off the moped and use it as a barrier.

23. Keep your moped in good repair and well maintained.

24. If your moped breaks down or runs out of gas, move off the road. Make repairs well away from traffic. If you must walk a disabled moped along a roadway, get as far off the road as possible and walk on the right side of the moped, with the vehicle between you and the traffic.

25. Never lend your moped to anyone who does not have the proper credentials or license or to anyone less capable of operating it than you are. If you do lend it, be sure the person receives sufficient instruction in operating the controls, coping with traffic, and pertinent laws before taking it into traffic.

Conclusions

Preceding sections of this report have explored the past and present status of the moped — its growth in the U.S. market; the many positive characteristics of the vehicle that contribute to its popularity here and in Europe; the variations in state legislative approaches to regulating this new, hybrid vehicle; and the safety issues that concern traffic safety experts with regard to the moped as an element of the American traffic stream. Many such issues have been identified, some of considerable import to traffic safety and some comparatively minor. It is not the purpose of this report to judge the moped as "safe" or "unsafe," but rather to consider the potential problems of this new traffic element and to suggest ways such problems might be averted or alleviated.

The moped, according to most who are familiar with it, is not just a passing fad; it is a transportation alternative that is here to stay, probably in significant numbers. The enactment of moped legislation in 37 states attests to widespread belief in this fact. The moped has much to offer America — economy, energy conservation, reduction of environmental pollution, recreation, and the many other benefits that have been discussed in this report. Another feature should be added to this list of the moped's desirable features: improved safety. Among the safety concerns and possible problems relating to the moped that have been identified are youth, inexperience, lack of skill, and unsafe driving practices on the part of the operator; lack of power, low visibility, and design of brake controls and other features of the vehicle; and motorists' awareness of and attitudes toward the moped as an element in the traffic stream.

Buchanan of the NHTSA, which has done more in sponsoring safety-related moped research than any other agency, had this to say:

> Certainly, we do not wish to characterize mopeds as being so dangerous that they should be banned from the highways. On the other hand, it is evident that each day accidents occur because moped riders are inadequately prepared with the knowledges, skills and equipment necessary to survive in traffic on two-wheeled motor vehicles. And, it is clear that often the public is encouraged to purchase and ride mopeds by advertising campaigns which ignore or substantially understate the risks involved (1:4).

Kenneth Licht of the National Safety Council has voiced similar views:

> Safety concerns notwithstanding, all signs point to continued passage of special moped legislation similar to that already on the books in many states . . . With virtually everything going for it, reservations about the safety of the moped may be lost in the rush to buy (28:8).

The safety of the moped concerns and must be addressed by all levels of government, industry, the education community, and the consumer. Some general and specific recommendations for attention by these groups are described below. These recommendations reflect the opinions of the many authorities cited throughout this report, the facts that have been revealed by traffic research to date, and logical conclusions drawn from the analysis of those facts. The recommendations may additionally be limited by information not available to the writer at the time this report was prepared.

Perhaps the greatest factor in determining what measures actually are needed will be the passage of time. Time will undoubtedly bring such changes as fluctuations in the

numbers of mopeds in the U.S. traffic stream, results from present and ongoing research, increasing availability of traffic accident statistics, increased familiarity of other motorists with the moped, a clearer picture of needed energy conservation measures, and increased stabilization of the legislative situation regarding the moped. It is difficult to predict how such changes will affect the overall safety picture, but the U.S. traffic safety community cannot afford to postpone addressing the safety questions that have already been identified until "all the answers are in." Therefore, the following issues and actions are suggested for consideration in the interim.

Research

Several moped-related research studies presently being conducted or planned for the near future were described under "Current Research." Continuation of these studies and similar research is greatly needed to inform our future assessment of moped safety. The NHTSA has also identified a need for

> an analysis of the moped driving task in order to identify the behaviors, knowledges, and skills that are required to safely operate a moped, and that are different from those involved in the operation of other two-wheeled vehicles. This work would also identify instructional objectives for moped safety education and would generate recommendations for educational program development. It would also identify performance testing standards for use in educational programs and for possible use in establishing moped driver licensing criteria (1:6-7).

This kind of information will offer much in the resolution of such controversies as whether moped-specific driver education and skill testing are needed and what minimum competencies are needed for safe moped operation.

In addition, far more accident data which specifically identify moped involvement are needed than are now available in this country. This will require widespread revision of accident reporting forms and procedures, of the kind that has only begun in some states. According to Licht,

> until and unless police accident investigation forms are coded to identify the moped as a vehicle in its own right it will be difficult if not impossible to generate any reliable information about moped accident involvement in the U.S. (28:8).

And until such information is available, some of the moped safety issues will remain largely speculation.

Federal Standards

Two of the Federal Motor Vehicle Safety Standards relating to mopeds have been cited repeatedly as needing consideration for revision: Standard 108 relating to turn signals and Standard 123 relating to placement of brake controls. It has been suggested that, in order to eliminate the situation in which a moped operator signals with the left hand while applying the front brake with the right, one or both of the following changes in the standards seem to be called for: (1) the original requirement in Standard 108 for turn signals should be reestablished and (2) mandatory front-right and rear-left brake placement should be removed from Standard 123 (or that designation reversed) so that the rear brake can be applied with the right hand. It is also suggested that applying a minimum sound production level for moped horns might be considered to insure that

all moped models can be heard above the din of normal traffic. Alternatively, state laws could apply such minimum levels for horns on mopeds operated in their jurisdictions.

State Legislation

As has been shown in preceding discussions, moped legislation varies substantially from one state to another. As is recommended by the NHTSA and by other agencies and individuals, uniformity in moped legislation among the states (both those that have already enacted moped legislation and those that have not) is needed. A model for such legislation, such as that being drafted by the NHTSA (1:6), would greatly simplify the states' task of revising their own laws with some degree of consistency.

Results from present research and from revised accident reporting procedures should make clearer what combination of laws and regulations is optimal for protecting the moped operator and others in the traffic stream. In the meantime, however, the following guidelines, gleaned from the research data, opinions of traffic safety experts, and experiences of the states — as discussed in this report — are offered.

Definition. A separate definition of the moped (different from both the bicycle and the motorcycle) as presently applied in the majority of the moped states is recommended. Specifications should include a maximum speed of 30 m.p.h., and preferably no lower than 30 m.p.h. because an "under-powered" vehicle has been found to be a greater hazard in the traffic mix than one capable (or almost capable) of keeping up with normal city driving speeds.

License. A license should be required of all moped operators. Preferably, this should be a special moped operator's license or a moped endorsement on a regular driver's license. This would make possible much closer screening of moped operator applicants in terms of knowledge and skill specifically related to the moped.

Age. As has been shown, the majority of moped states require a minimum operator age of 16, although some specify 12, 14, or 15. The Moped Association of America supports a minimum age in the range of 14 to 16. Based on the limited statistics available to date, youths 19 and under are over-involved in moped accidents. Results from improved accident investigation procedures and from present research will tell us more about the accident involvement of 14- to 16-year-olds as compared with those 16 and older. It would appear, however, that the effects of increasing maturity and the exposure to driver education that may be experienced in high school would contribute to the safety consciousness and skill of young drivers. Therefore, a minimum age of 16 may be found to lessen the problem of young, inexperienced, exuberant moped operators. Mandatory driver education for moped operators 16 to 18, preferably related specifically to two-wheeled vehicles, is also recommended for the same purpose.

Testing. Whether or not driver education is mandatory for young moped operators, applicants for the moped license should be required to demonstrate knowledge and proficiency in moped operation before being permitted to participate in traffic. This view is supported by the National Safety Council (46:3); Licht (20:4-5, 28:7), the California Department of Transportation (15:4), Evans (23:64), and others. Presently, requirements for a road test on a moped are almost nonexistent, even among the moped states.

Registration. Currently the states are divided in their requirements for moped registration (21 states now require it). Registration of the vehicle is needed for two reasons. First, as Buchanan points out, "without adequate registration and accident data it is impossible to make an accurate assessment of moped accidents." (42:8) Registration is the one efficient way of keeping track of mopeds in use, of accident rates in proportion to the size of the moped population, and of other valuable demographic information needed during this period of assessing the moped situation. Second, moped theft has been identified as a growing problem in many states. In states where mopeds are not registered, identification and return of stolen vehicles and subsequent theft control become extremely difficult tasks. Moped groups such as the Moped Owners Association in New Jersey have begun voluntary registries of mopeds to help deal with this problem, but statewide systems under government auspices might be a much more thorough approach to the problem (15:2, 12:8, 23:67, 47:19-20).

Helmets. The controversy surrounding the mandatory use of safety helmets — whether for motorcycles or for mopeds — is one not likely to be resolved in the near future. Many individuals and groups oppose mandatory use. Many others (National Safety Council, Licht (20:9-10), Consumer Union (19:323), and others) favor mandatory use. Still others (Langwieder (16:297), Evans (23:66), American Motorcycle Association, strongly recommend voluntary use by moped operators and widespread public education in the advisability of wearing helmets. However, Evans has shown that, given the choice, moped operators do not regularly use helmets, probably because the moped's simplicity makes the vehicle seem deceptively safe. Licht had this to say:

> Of course, there's no question about that as far as we're [the National Safety Council] concerned. A helmet, we feel, ought to be required. The American Medical Association will soon be releasing a study that they've done which indicates that their recommendations too are that cyclists — I'm talking now about bicyclists as well as motorcyclists and moped operators — should wear helmets. I don't think there's any question about that from a safety point of view. The problem, again, with collision with the two-wheeled vehicle is not necessarily the initial collision between the moped and the car or whatever; it's the second collision when the moped operator strikes the ground, and this is where the head protection is absolutely vital (20:9).

State laws requiring safety helmets for moped operators, at least the young or inexperienced operators, are therefore recommended as a means of improving the safety of the operator who brings less experience to the driving task and who may not understand the full risk involved in operating the moped. It is further recommended — especially if mandatory usage is not instituted — that state education agencies assume as part of their responsibility the education of ***all*** potential moped operators, regardless of age or experience, regarding safety risks to the helmetless operator and passenger.

Lights. Another measure that can improve the safety of the moped operator by increasing his or her visibility is the daytime use of lights. It has also been suggested that the moped be designed in such a way that the lights automatically turn on when the ignition is started.

Passengers. Carrying a passenger on a moped has been shown to be inadvisable because of the effect of a passenger's weight on vehicle performance and because of the greater safety risk to the passenger. The provision already existing in many state laws, which permits the carrying of passengers only if the vehicle is designed for them, is

the very minimum safeguard needed to address this potential problem. However, states would do well to consider prohibiting the carrying of passengers on mopeds altogether. Further study is perhaps needed to determine the impact of carrying passengers on moped accident-involvement and the comparative rate and severity of injuries to passengers as opposed to operators.

Other. The states should remain attuned to any forthcoming research that might indicate a need to revise existing statutes, in the above mentioned areas or others, and should adopt the position that the best combination of statutes and rules will be that which promotes and protects the safety of the moped operator.

Local Measures

Local enforcement of traffic laws regarding mopeds — age, possession of a proper license, safe driving practices by moped operators and by motorists sharing the roadway with them, and others — and up-to-date awareness of current moped laws by all officers are important continuing factors in keeping the traffic environment as safe as possible for the moped operator.

Manufacturers

Langwieder (16), on the basis of his study of collision characteristics and injuries to motorcycle and moped operators, posed several recommendations for manufacturers of automobiles, mopeds, and motorcycles, which merit consideration by the manufacturers and by those who set standards of manufacture.

On cars and trucks (with which mopeds may collide), Langwieder recommends:

1. redesign of car front ends, A posts, and top frames to include a safe (less angular) profile and an energy absorbing structure over the surface to soften the impact of a moped operator against the vehicle;

2. truck rejection barriers between the front and rear wheels to prevent a moped and operator from skidding underneath the vehicle;

3. more rounded roof tops and weatherstripping; and

4. door hinges and other fixtures designed so as not to protrude from the surrounding surface.

On mopeds and motorcycles, he recommends:

1. a passive restraint system, such as an air bag;

2. energy absorbing structures above the front wheel to soften the impact of the operator against his or her own vehicle;

3. placement of the seat as high as possible to improve the operator's trajectory in case of a collision, decreasing the likelihood of direct impact with the car;

4. extension of the front fork at a more oblique angle and addition of a deformation support on the frame to remove the operator further from the impact area; and

5. the addition of a spacious knee bar with an energy absorbing structure as close as possible to the knee and lower leg region to improve the upward trajectory of the operator if a front-end collision with an automobile occurs.

Education

Lack of instruction and experience and unsafe driving practices (especially by young operators), have been cited as two major safety problems relating to the moped operator. Unfamiliarity and hostile attitudes on the part of other motorists have also been noted. Lack of knowledge of the safety variables among different makes and models of mopeds on the part of buyers is yet another problem that accompanies the influx of mopeds into the traffic stream. The answer to all these problems is education — of the potential moped operator, of the motorist, and of the consumer.

Education of the moped operator. It has long been accepted that the best way to prepare a person to drive a car responsibly is by providing high quality driver education programs. Although some moped industry representatives contend that the design of the vehicle is so simple that no special training is needed, the operation of the controls is only a small part of learning to drive safely. In a quality driver education program students learn not only to operate the controls of the vehicle. They also learn how to drive safely and defensively; what the potential hazards are and how to identify, avoid, and respond to them; and what the laws are that govern use of the vehicle on the roadway. The same kind of education is needed by the moped operator — especially the young operator — preparing to enter the stream of traffic. While a moped operator will benefit from having taken a traditional driver education course or from years of experience driving a car, this is not the ideal situation for providing moped instruction. A moped is not a car; it faces somewhat different hazards and requires, to an extent, different handling to avert dangerous situations. Moped-specific driver education appears to be what is needed to prepare the operator adequately to enter the traffic stream on a moped. There are a number of alternatives for providing this kind of education that might be considered:

1. A moped mini-course might be offered as an elective supplementing the regular driver education course. With the student having received instruction in the basics of traffic safety in the regular course, the moped course could deal only with moped-specific issues, techniques, and vehicle operation.

2. A full moped course might be designed, including classroom, range, and on-road experience, to be taught in the junior high schools, public seminars, college continuing education departments, YMCA/YWCA programs, and other locations. Apparently very little has been done to date in setting up this type of course. New Jersey offers moped driver education programs in junior high schools and police-sponsored moped courses in schools and public seminars (19:323). Saddleback College in Mission Viejo, California offers a 10-hour moped safety course. The outline for that course is presented in Appendix D.

3. Moped safety handbooks or instructional packages, while not the ideal form of moped education because they do not offer the advantages of human interaction, supervised practice, demonstration, and other techniques that are possible in a rider course, nonetheless do provide some instruction where none other is available. Therefore, they are suggested as an educational strategy that may be useful in the absence of moped courses or, preferably, as a supplement to existing courses. A few examples of such handbooks are listed in the Notes and Bibliography (see items 32 through 38).

Education of the motorist. Education of the motoring public is needed to increase their awareness and acceptance of the moped and of the rights of a moped operator and to improve their understanding of motorists' actions that can create hazards for the operator of a two-wheeled vehicle. Efforts in this regard might be made by state departments of government dealing with education, transportation, and highway safety; by traffic safety organizations at local, state and national levels; by private institutions (for example, automobile dealers and insurance agencies); and by any other organization interested in promotion of traffic safety.

Education of the consumer. The consumer — and this might be the operator, a parent of the operator, or someone else — also needs to be educated. This person needs to know what to look for in buying a moped in terms of safety (effective front and rear brakes, adequate acceleration, traction limits, handling characteristics, and so on) and what accessories are available to improve the safety of the vehicle and the operator. In addition, a parent buying a moped for a youngster needs to understand his or her responsibility in making sure the youngster has the "skill, knowledge, and maturity to handle a moped safely" (28:8).

Other

Suggestions have also been made with regard to encouraging use of the moped for the purpose of furthering environmental causes. Gordon Bishop (1:7) has suggested that, because the moped can contribute to environmental and energy conservation in this country, its increased use should be fostered by such measures as these:

1. special moped parking areas provided at train stations, express bus stops, and other commuter link-ups to encourage use of mass transit systems;

2. incentives offered by employers to employees for arriving by moped (perhaps access to privileged parking or some type of bonus);

3. reduced campus parking fees offered to faculty, staff, and students who drive mopeds instead of cars.

In addition, local jurisdictions could encourage moped use by permitting moped operators to use bicycle racks and other bicycle facilities. Large spectator facilities (fairs, sporting events, race tracks, cultural events, and so on) could offer less expensive, more convenient, or free parking for spectators who arrive on mopeds. There are probably many other ways that energy conservation and environmental preservation could be encouraged at national, state, local, and private levels by taking advantage of this low-cost, low-fuel, low-pollution form of transportation.

Conclusion

Meanwhile, however, several tasks remain for the traffic safety community to help make the moped a safe vehicle in American traffic:

1. learn as much as possible, through research and compilation of accident data, about the present and potential safety of the moped;

2. use that information to identify needed changes in the ways we regulate the construction and use of the moped and enhance the safety of the environment in which it is operated; and

3. educate. Educate the buyers and users of mopeds. Educate the motorists who share the road with mopeds.

Klaus Langwieder summarized our challenge in this way:

> By consequent utilization of all possibilities of increasing motorcycle/moped safety by legislators, industry and drivers, the progress in safety undoubtedly made within recent years for car drivers can also be partially realized in a reduction of the enormous injury risk to motorcyclists/moped drivers (16:300).

Moped use is still young in America. We have much to learn about its safety implications for the traffic situation and much to gain from its presence. The next ten years should tell us much about the efficacy of our approach up until now and about what our approach needs to be in the future.

Notes

For full bibliographic information for these entries, please refer to Appendix E, Bibliography.

1. Lewis S. Buchanan, "Moped Safety: Program Development and Research by the National Highway Traffic Safety Administration."
2. Insurance Institute for Highway Safety, *Status Report,* November 24, 1975.
3. U.S., General Services Administration, *Federal Register,* April 12, 1974.
4. _____, *Federal Register,* September 12, 1974.
5. *Moped World,* "Moped World Talks with Serge Seguin of Motobecane."
6. *Bicycle Journal,* "Government Study Says 3 Million Mopeds Can be Buzzing the U.S. by 1980."
7. Edward F. Kearney, memo to Governors Highway Safety Representatives and Legislative Reference Bureaus, August 14, 1975.
8. Motorized Bicycle Association, "The Motorized Bicycle."
9. U.S., General Services Administration, *Federal Register,* November 28, 1975.
10. Insurance Institute for Highway Safety, *Status Report,* December 10, 1975.
11. *Ohio Traffic Record,* "Legislation to Clarify Being Introduced; Moped/Motorcycle Specifications Confuse Operators," March 1977.
12. Motorized Bicycle Association, "Motorized Bicycle: Safe Transportation."
13. Lewis S. Buchanan, Telephone Conversation, June 28, 1978.
14. *Bicycle Dealer Showcase,* "Dealer Survey '78."
15. California Department of Transportation (Operations, Office of Engineering), memo, "Issues and Policy Recommendations on MOPEDS."
16. Klaus Langwieder, "Collision Characteristics and Injuries to Motorcyclists and Moped Drivers."
17. Motorcycle Industry Council, *State Legislative Reports.*
18. _____, *Government Relations Bulletins.*
19. Consumer Union, "Mopeds."
20. WNET, "The MacNeil/Lehrer Report: Mopeds."

21. *Moped World*, "Lung Association Applauds Low Pollution of Mopeds."

22. Gordon L. Bishop, "Saving the Environment: The Moped Is a Step in the Right Direction."

23. Michael L. Evans, A Safety Analysis of the Moped (thesis).

24. _____, "A Safety Analysis of the Moped, Part 3," *Moped World*.

25. Kenneth F. Licht, presentation to the National Conference of Governor's Highway Safety Representatives, October 1977.

26. Patricia Z. Barry, "The Role of Inexperience in Motorcycle Crashes."

27. Michael L. Evans, "Improving the Moped's Status and Safety."

28. Kenneth F. Licht, "The Mopeds Are Coming."

29. Motorized Bicycle Association, "For Immediate Release, October 25, 1977."

30. Serge Seguin, "This Is the Motorized Bike: Tiger vs. Pussycat."

31. John J. O'Mara, "Contributory Factors in Motorcycle Casualty Accidents."

32. Ohio Department of Highway Safety, *Ohio Driver's Handbook*.

33. _____, "Moped Safety Tips."

34. _____, "Ohio's New Moped Law."

35. State of Michigan, Secretary of State, "Motorcycles and Mopeds."

36. New Jersey Division of Motor Vehicles, "Motorized Bicycle (Moped) Operator's Handbook."

37. _____, Office of Highway Safety, "Motorized Bicycling . . . Made Safe and Sensible."

38. Moped Owners Association, "Safety Program."

39. Lewis S. Buchanan, Donald C. Biscoff, and Henri A. Richardson, "A Preliminary Analysis of Safety Helmet Effectiveness."

40. P.V. Hight, A.W. Siegel, and A.M. Nahum, "Injury Mechanism in Motor-cycle Collisions."

41. B.M. Severy, H.M. Brink, and D.M. Blaisdell, "Motorcycle Collision Experiments."

42. Lewis S. Buchanan, "Mopeds: A Calculated Risk."

43. *Moped World*, "Safety Helmets for Mopeds."

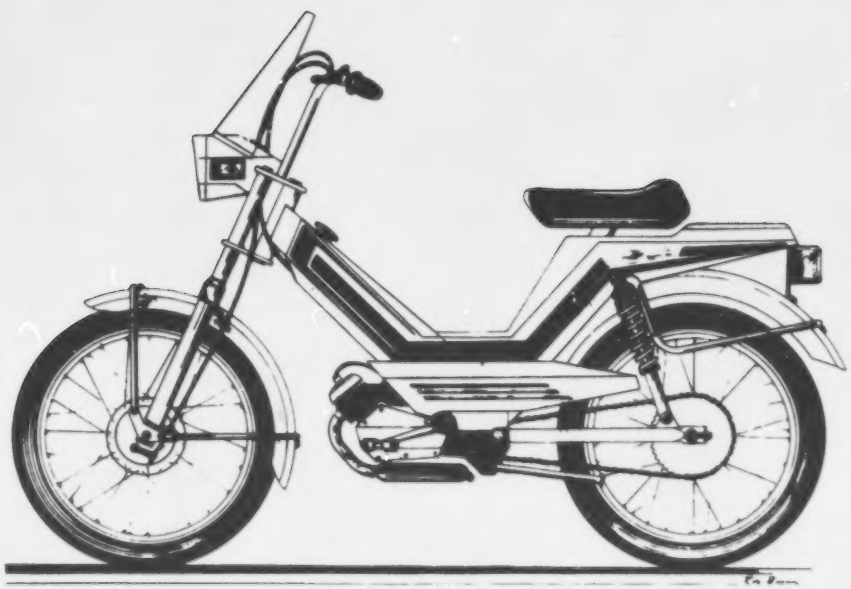
44. Lewis S. Buchanan, "The Motorcycle-Bicycle Safety Analogy."

45. Linda Lagerroos, "Some Safety Tips for Moped Travel."

46. National Safety Council, "Safety Education Data Sheet No. 101: Mopeds."

47. Michael Evans, "A Safety Analysis of the Moped, Part 1, *Moped World*.

Appendices



developing
careful moped drivers
through education

Ohio Department of Education

Appendix A
Federal Motor Vehicle Safety Standards Relating to the Moped

Mopeds

The NHTSA does not have a "Moped" Motor Vehicle Classification, per se. These low powered, low speed vehicles are currently classified as "Motor-Driven Cycles" a subcategory of motorcycle, and are defined by the code of federal regulations (49 CFR 571.3b) as a "Motorcycle with a Motor That Produces 5 Brake Horsepower or Less." Certain requirements of FMVSS Nos. 108, 122 and 123 have been changed to ease the burden of compliance without jeopardizing basic safety performance for those motor-driven cycles whose speed attainable in one mile is 30 mph or less. In addition these standards[26] FMVSS 119 and 120 are also applicable; copies of these standards and other requirements are attached.

[26]U.S. Dept. of Transportation. National Highway Safety Bureau. Federal motor vehicle safety standards and regulations, with amendments and interpretations. Washington, U.S. Govt. Print. Off., 1969

Federal Motor Vehicle Safety Standards Relating to the Moped

Contents

1. Rulemaking Actions: Docket 74-16

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   - Rule issued 9/6/74. Effective 10/14/74

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3. Part 567 - Certification

4. Part 571.108 - Lamps, Reflective Devices and Associated Equipment

5. Part 571.119 - New Pneumatic Tires for Vehicles Other Than Passenger Cars

6. Part 571.120 - Tire Selection and Rims for Vehicles Other Than Passenger Cars

7. Part 571.122 - Motorcycle Brake Systems

8. Part 571.123 - Motorcycle Controls and Displays

PROPOSED RULES

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[49 CFR Part 571]

[Docket No. 74–16; Notice 1]

MOTOR VEHICLE SAFETY STANDARDS

Proposed Modification of Requirements for Motor-Driven Cycles

This notice proposes amendments of 49 CFR 571.108, 571.122, and 571.123, Motor Vehicle Safety Standards Nos. 108, 122, and 123, that would modify current requirements applicable to motor-driven cycles.

The National Highway Traffic Safety Administration has been petitioned by Cycles Peugeot, Ateliers de la Motobecane, and S.I.N.F.A.C. for "(1) recognition of the power-assisted bicycle as a separate category of motor vehicle and (2) promulgation of safety standards for the bicycle appropriate to its low power and speed." Similar petitions have been filed by Bermuda Bikes, Inc. and Robert F. Smith, who are retail dealers of low-powered two-wheeled vehicles.

These vehicles are currently classified as "motor-driven cycles", a subcategory of "motorcycle" that is defined by 49 CFR 571.3(b) as "a motorcycle with a motor that produces 5-brake horsepower or less". As such they are required to meet Federal motor vehicle safety standards, most importantly the ones covering lights (No. 108), hydraulic brake systems (No. 122) and controls and displays (No. 123). Petitioners contend that vehicles which produce no more than 1.5 horsepower deserve a separate classification, and that existing standards applicable to motor-driven cycles are not reasonable, practicable, and appropriate for them.

This agency has decided not to establish a separate category of motor vehicle. The problems of conforming to the standards encountered by vehicles with 1.5 horsepower or less do not appear to be sufficiently different from those of vehicles between 1.5 and 5 horsepower to justify a separate category. However, this agency has reviewed the requirements applicable to motor-driven cycles in light of the petitions and the renewed public interest in this type of vehicle, and has found that certain minor modifications in the standards may ease the burden of compliance without jeopardizing basic safety performance.

With respect to Standard No. 108, this agency has tentatively determined that in view of the speed and weight characteristics of motor-driven cycles, the problems associated with hand signaling and the lack of turn signal lamps are not as significant as they are with the larger motorcycles. It is therefore proposed that the requirement for turn signals be deleted for motor-driven cycles with a top-speed capability of 30 mph or less. Also, it has been found that low-powered cycle motors may have some difficulty in providing the full required illumination. It is proposed that the required stop-lamp photometric output for low top-speed motor-driven cycles be reduced to one-half that for motorcycles generally. It should be noted that Standard 108 already contains reduced photometric output requirements for motor-driven cycle headlamps.

Because of the low speed of these vehicles, it appears that some modification of Standard No. 122, Motorcycle Braking, would be appropriate. Since fade recovery is not a safety-critical requirement for vehicles with low top speeds, it is proposed that a motorcycle be exempted from the fade requirements of S5.4 if the speed it attains in 1 mile is 30 mi/h or less. Further, since Table I provides no maximum stopping distances below 30 mi/h, values for stops from 25, 20, and 15 mi/h are proposed, maintaining the same deceleration values as required of higher speed stops. For example, a stop from 25 mi/h in the total system effectiveness test would have to be made in not more than 19 feet.

Finally, the NHTSA is proposing an amendment to the Motorcycle Controls and Displays standard, No. 123. Manufacturers of lightweight motor-driven cycles have petitioned that placement of the rear brake control on the left handlebar, rather than at the right foot, be allowed. This deviation from the standardized position for motorcycles would appear to have a minimal detrimental effect and it is therefore proposed by this notice.

In consideration of the foregoing, it is proposed that 49 CFR Part 571 be amended as follows:

§ 571.108 [Amended]

1. In § 571.108 the following definition would be added to paragraph S3:

"Speed attainable in 1 mile" means the speed attainable by accelerating at maximum rate from a standing start for 1 mile on a level surface.

2. In § 571.108 the following

two sub-paragraphs would be added to paragraph S4:

S4.1.1 __ A motor-driven cycle whose speed attainable in 1 mile is 30 mi/h or less need not be equipped with turn signal lamps.

S4.1.1__ A motor-driven cycle whose speed attainable in 1 mile is 30 mi/h or less may be equipped with a stop lamp whose photometric output for the groups of test points specified in Figure 1 is at least one-half of the minimum values set forth in that figure.

§ 571.122 [Amended]

3. In § 571.122, the following sentence would be added to S5.4: "These requirements do not apply to a motorcycle whose speed attainable in 1 mile is 30 mi/h or less."

4. In § 571.122, Table I would be amended to add the following values:

Vehicle test speed miles per hour	Preburnish effectiveness total system (S5.2.1)	Preburnish effectiveness partial mechanical systems (S5.2.2)	Effectiveness total system (S5.4) (S5.7.1)	Effectiveness partial hydraulic systems (S5.7.2)
	I	II	III	IV
15	13	30	11	25
20	24	54	19	44
25	37	84	30	68

§ 571.123 [Amended]

5. In § 571.123, Table I would be amended by revising Item II, Column 2, to read:

"Right foot control.[1] Left handlebar permissible for motor-driven cycles."

Interested persons are invited to submit comments on the proposal. Comments should refer to the docket number and be submitted to: Docket Section, National Highway Traffic Safety Administration, Room 5108, 400 Seventh Street, S.W., Washington, D.C. 20590. It is requested but not required that 10 copies be submitted.

All comments received before the close of business on the comment closing date indicated below will be considered, and will be available for examination in the docket at the above address both before and after that date. To the extent possible, comments filed after the closing date will also be considered. However, the rulemaking action may proceed at any time after that date, and comments received after the closing date and too late for consideration in regard to the action will be treated as suggestions for future rulemaking. The NHTSA will continue to file relevant material as it becomes available in the docket after the closing date, and it is recommended that interested persons continue to examine the docket for new material.

Comment closing date: May 13, 1974.

Proposed effective date: 30 days after publication of final rule in FEDERAL REGISTER.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718. 15 U.S.C. 1392, 1407; delegations of authority at 49 CFR 1.51 and 49 CFR 501.8.)

Issued on April 9, 1974.

ROBERT L. CARTER,
Associate Administrator, Motor Vehicle Programs.

[FR Doc. 74—8461 Filed 4-11-74; 8:45 am]

RULES AND REGULATIONS

CHAPTER V – NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket No. 74–16; Notice 2]

PART 571 – FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Motor-Driven Cycles

This notice amends 49 CFR 571.108, 571.122, and 571.123, Motor Vehicle Safety Standards Nos. 108, 122, and 123, to modify current requirements that apply to motor-driven cycles.

Interested persons have been afforded an opportunity to participate in the making of the amendment by a notice of proposed rulemaking published on April 12, 1974 (39 FR 13287) and due consideration has been given to all comments received in response to the notice, insofar as they relate to matters within its scope.

The prior notice responded to petitions by Cycles Peugeot, Ateliers de la Motobecane, and S.I.N.F.A.C., manufacturers, and Bermuda Bikes, Inc., and Robert F. Smith, retail dealers. The notice proposed that a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less need not be equipped with turn signal lamps, and may be equipped with a stop lamp with one-half the photometric output otherwise required. Braking fade and recovery requirements also would not apply to these low-speed vehicles. Maximum stopping distance values for the various tests would be added for test speeds of 25, 20, and 15 mph. Finally, a braking control on the left handlebar would be a permissable alternative to the required right foot braking control.

The comments received addressed both areas of performance covered in the proposal, and areas where no standards currently exist, such as motors, transmissions, pedals, and a request for exemption from Standard No. 119, Tires for Vehicles Other Than Passenger Cars. As these latter comments cover matters beyond the scope of the proposal, this notice does not discuss them. The agency, however, has been formally petitioned for rulemaking covering transmissions and Standard No. 119, and will respond to the petitioners in the near future.

The decision by NHTSA not to establish a separate category of vehicle was objected to by some commenters. In support of their request, they argued that the majority of motor-driven cycles have engines producing only 1.5 to 2 horsepower, and consequently low maximum speeds, reducing the need for forward lighting that is currently required of these vehicles. Petitioners submitted no data justifying their request. The NHTSA, however, intends to study the matter of forward lighting for low-powered two-wheeled vehicles through a research contract with the University of Michigan. When the contract is completed the agency will then decide whether further rulemaking is warranted.

The proposal distinguished motor-driven cycles on the basis of maximum speed attainable in 1 mile, rather than on horsepower, and the value selected, 30 mph, fell within the maximum (40 mph) and minimum (20 mph) suggested by commenters. The NHTSA has concluded therefore that the distinction should be adopted as proposed.

Some manufacturers requested restrictive controls on power plant output, apparently in fear that the engine of a vehicle with a top speed of 30 mph or less could be modified to exceed that speed, and therefore cause the vehicle to no longer comply with the Federal standards. This agency has not found that course of action to be practicable. The various ways to modify a vehicle after purchase cannot be anticipated or prevented at the manufacturer level. On the other hand, the great majority of consumers use their vehicles in the form in which they were purchased. The motor-driven cycle category itself contains a limitation of 5 horsepower, which will be applicable to the special lighting modifications. In the NHTSA's judgment, modifications by consumers and the consequent equipment requirements should continue to be regulated at the State level.

The fact that the agency took no action to propose a reduction in existing headlamp requirements for motor-driven cycles was criticized by several manufacturers as unduly restrictive because of the low speed and power output of their vehicles. No justification has been shown for such a change. Motor driven cycles therefore must have sufficient generating and/or battery capacity to meet the headlamp requirements.

There was no substantive objection to the actual proposals for omission of turn signals, reduced stop lamp photometrics, relief from brake fade requirements, inclusion of maximum allowable stopping distances for

low speeds, and rear brake control placement. Accordingly, the standards are being amended in the manner proposed.

Standard No. 122 is also being amended to delete the final effectiveness test (S5.5) for those motor-driven cycles excused from the fade and recovery requirements. The purpose of the final effectiveness test is to check the stopping ability of the vehicle after the fade and recovery tests. Since this requirement has been eliminated for motor-driven cycles of low top-speed, the final effectiveness test is redundant, and an unnecessary duplication of the second effectiveness test. No safety purpose is served by its retention. Language is also added to the fade and recovery and final effectiveness test procedures (S7.6, S7.7, and S7.8), making it clear that they do not apply to motor-driven cycles whose speed attainable in 1 mile is 30 mph or less.

In consideration of the foregoing, 49 CFR Part 571 is amended as follows:

§ 571.108 [Amended]

1. In § 571.108 the following definition is added to paragraph S3:

"Speed attainable in 1 mile" means the speed attainable by accelerating at maximum rate from a standing start for 1 mile on a level surface.

2. In § 571.108 the following two sub-paragraphs are added to paragraph S4:

S4.1.1.26 A motor-driven cycle whose speed attainable in 1 mile is 30 mph or less need not be equipped with turn signal lamps.

S4.1.1.27 A motor-driven cycle whose speed attainable in 1 mile is 30 mph or less may be equipped with a stop lamp whose photometric output for the groups of test points specified in Figure 1 is at least one-half of the minimum values set forth in that figure.

§ 571.122 [Amended]

3. In § 571.122, the following sentence is added to S5.4, S5.5, S7.6, S7.8, and at the end of S7.7: "These requirements do not apply to a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less."

4. In § 571.122, Table I is amended to add the following values:

Vehicle test speed miles per hour	Preburnish effectiveness total system (S5.2.1)	Preburnish effectiveness partial mechanical systems (S5.2.2)	Effectiveness total system (S5.4) (S5.7.1)	Effectiveness partial hydraulic systems (S5.7.2)
	I	II	III	IV
18	18	83	11	25
20	24	54	12	44
25	27	84	30	68

§ 571.123 [Amended]

5. In § 571.123, Table I is amended by revising Item 11, Column 2, to read:

"Right foot control.[1] Left handlebar permissible for motor-driven cycles."

Effective date: October 14, 1974. As the amendments allow new options for compliance, relieve restrictions, and impose no additional burdens on regulated persons, it is found for good cause shown that an effective date earlier than 180 days after issuance of the amendments is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51)

Issued on September 6, 1974.

JAMES B. GREGORY,
Administrator.

[FR Doc. 74-21092 Filed 9-11-74; 8:45 am]

Part 566 – Manufacturer Identification

(Docket No. 71-11; Notice 2)

§ 566.1 Scope. This part requires manufacturers of motor vehicles, and of motor vehicle equipment to which a motor vehicle safety standard applies, to submit identifying information and a description of the items they produce.

§ 566.2 Purpose. The purpose of this part is to facilitate the regulation of manufacturers under the National Traffic and Motor Vehicle Safety Act, and to aid in establishing a code numbering system for all regulated manufacturers.

§ 566.3 Application. This part applies to all manufacturers of motor vehicles, and to manufacturers of motor vehicle equipment, other than tires, to which a motor vehicle safety standard applies (hereafter referred to as "covered equipment").

§ 566.4 Definitions. [All terms defined in the Act and the rules and standards issued under its authority are used as defined therein. Specifically, "incomplete vehicle," "intermediate manufacturer," and "final-stage manufacturer" are used as defined in Part 568, Vehicles Manufactured in Two or More Stages. (37 F.R. 1364—January 28, 1972. Effective: 2/1/72)]

§ 566.5 Requirements. Each manufacturer of motor vehicles, and each manufacturer of covered equipment, shall furnish the information specified in paragraphs (a) through (c) of this section to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.

(a) Full individual, partnership, or corporate name of the manufacturer.

(b) Residence address of the manufacturer and State of incorporation if applicable.

(c) Description of each type of motor vehicle or of covered equipment manufactured by the manufacturer, including for motor vehicles, the approximate ranges of gross vehicle weight ratings for each type.

(1) Except as noted below, the description may be of general types, such as "passenger cars" or "brake fluid."

(2) In the case of multipurpose passenger vehicles, trucks, and trailers, the description shall be specific enough also to indicate the types of use for which the vehicles are intended, such as "tank trailer," "motor home," or "cargo van."

(3) [In the case of motor vehicles produced in two or more stages, if the manufacturer is an incomplete vehicle manufacturer, the description shall so state and include a description indicating the stage of completion of the vehicle and, where known, the types of use for which the vehicle is intended.

> **EXAMPLE:** "Incomplete vehicle manufacturer — Chassis-cab intended for completion as van-type truck."

If the manufacturer is an intermediate manufacturer, or a final stage manufacturer, the description shall so state and include a brief description of the work performed.

> **EXAMPLE:** "Multipurpose passenger vehicles: Motor homes with GVWR from 8,000 to 12,000 pounds. Final-stage manufacturer — add body to bare chassis."

(37 F.R. 1364—January 28, 1972. Effective: 2/1/72)]

§ 566.6 Submittal of information. Each manufacturer required to submit information under § 566.4 shall submit the information not later than February 1, 1972. After that date, each person who begins to manufacture a type of motor vehicle or covered equipment for which he has not submitted the required information shall submit the information specified in paragraphs (a) through (c) of § 566.1 not later than 30 days after he begins manufacture. Each manufacturer who has submitted required information shall keep his entry current, accurate and complete by submitting revised information not later than 30 days after the relevant changes in his business occur.

36 F.R. 20977
November 2, 1971

Effective: June 1, 1971
January 1, 1972

Part 567 – Certification

(Dockets No. 70–6, 70–8, and 70–15)

(Revised and reissued April 8, 1971)

§ 567.1 Purpose and scope. The purpose of this part is to specify the content and location of, and other requirements for, the label or tag to be affixed to motor vehicles required by section 114 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1403) ("the Act") and to provide the consumer with information to assist him in determining which of the Federal Motor Vehicle Safety Standards (Part 571 of this chapter) ("Standards") are applicable to the vehicle.

§ 567.2 Application. (a) This part applies to manufacturers and distributors of motor vehicles to which one or more standards are applicable.

(b) In the case of imported motor vehicles, the requirement of affixing a label or tag applies to importers of vehicles, admitted to the United States under § 12.80(b)(2) of the joint regulations for importation of motor vehicles and equipment (19 CFR 12.80(b)(2)) to which the required label or tag is not affixed.

§ 567.3 Definitions. All terms that are defined in the Act and the rules and standards issued under its authority are used as defined therein.

§ 567.4 Requirements for manufacturers of motor vehicles. (a) Each manufacturer of motor vehicles (except vehicles manufactured in two or more stages) shall affix to each vehicle a label, of the type and in the manner described below, containing the statements specified in paragraph (g) of this section.

(b) The label shall, unless riveted, be permanently affixed in such a manner that it cannot be removed without destroying or defacing it.

(c) Except for trailers and motorcycles, the label shall be affixed to either the hinge pillar, door-latch post, or the door edge that meets the door-latch post, next to the driver's seating position, or if none of these locations is practicable, to the left side of the instrument panel. If none of these locations is practicable, notification of that fact, together with drawings or photographs showing a suggested alternate location in the same general area, shall be submitted for approval to the Administrator, National Highway Traffic Safety Administration, Washington, D.C. 20590. The location of the label shall be such that it is easily readable without moving any part of the vehicle except an outer door.

(d) The label for trailers shall be affixed to a location on the forward half of the left side, such that it is easily readable from outside the vehicle without moving any part of the vehicle.

(e) The label for motorcycles shall be affixed to a permanent member of the vehicle as close as is practicable to the intersection of the steering post with the handle bars, in a location such that it is easily readable without moving any part of the vehicle except the steering system.

(f) The lettering on the label shall be of a color that contrasts with the background of the label.

(g) The label shall contain the following statements, in the English language, lettered in block capitals and numerals not less than three thirty-seconds of an inch high, in the order shown:

(1) Name of manufacturer; Except as provided in (i), (ii), and (iii) below, the full corporate or individual name of the actual assembler of the vehicle shall be spelled out, except that such abbreviations as "Co." or "Inc." and their foreign equivalents, and the first and middle initials of individuals, may be used. The name of the manufacturer shall be preceded by the words "Manufactured By" or "Mfd. By". In the case of imported vehicles, where the label required by this section is affixed by a person other than the final assembler of the vehicle, the corporate or individual name of the person affixing the label shall also be placed on the label in the manner described in this paragraph, directly below the name of the final assembler.

(i) If a vehicle is assembled by a corporation that is controlled by another corporation that assumes responsibility for conformity with the standards, the name of the controlling corporation may be used.

(ii) If a vehicle is fabricated and delivered in complete but unassembled form, such that it is designed to be assembled without special machinery or tools, the fabricator of the vehicle may affix the label and name itself as the manufacturer for the purposes of this section.

(iii) If a trailer is sold by a person who is not its manufacturer, but who is engaged in the manufacture of trailers and assumes legal responsibility for all duties and liabilities imposed by the Act with respect to that trailer, the name of that person may appear on the label as the manufacturer. In such a case the name shall be preceded by the words "Responsible Manufacturer" or "Resp Mfr."

(2) Month and year of manufacture: This shall be the time during which work was completed at the place of main assembly of the vehicle. It may be spelled out, as "June 1970", or expressed in numerals, as "6/70."

[(3) "GROSS VEHICLE WEIGHT RATING" or "GVWR" followed by the appropriate value in pounds, which shall not be less than the sum of the unloaded vehicle weight, rated cargo load, and 150 pounds times the vehicle's designated seating capacity. However, for school buses the minimum occupant weight allowance shall be 120 pounds. (36 F.R. 23571—December 10, 1971. Effective: January 1, 1972)]

(4) "Gross Axle Weight Rating" or "GAWR," followed by the appropriate value in pounds for each axle, identified in order from front to rear (*e.g.*, front, first intermediate, second intermediate, rear).

(5) The statement: THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE. The expression "U.S." or "U.S.A." may be inserted before the word "FEDERAL."

(6) Vehicle identification number.

(7) The type classification of the vehicle as defined in § 571.3 of Title 49 of the Code of Federal Regulations (*e.g.*, truck, MPV, bus, trailer).

[(h) In cases where different tire sizes are offered as a customer option, a manufacturer may at his option list more than one set of values for GVWR and GAWR, in response to the requirements of subparagraphs (g)(3) and (4) of this section. If the label shows more than one set of weight rating values, each value shall be followed by the phrase "with _____ tires," inserting the proper tire size designations. [A manufacturer may at his option list one or more tire sizes where only one set of weight ratings is provided. (37 F.R. 13696—July 13, 1972. Effective 7/13/72)]

EXAMPLE:
GVWR:
800 with 7.00x15LT(D) tires.
11000 with 8.25x16LT(E) tires.
GAWR:
Front—4080 with 7.00x15LT(D) tires.
5920 with 8.25x16LT(E) tires.
Rear—4080 with 7.00x15LT(D) tires.
5920 with 8.25x16LT(E) tires.
(36 F.R. 23571—December 10, 1971. Effective: January 1, 1972)]

§ 567.5 Requirements for manufacturers of vehicles manufactured in two or more stages. (a) Except as provided in paragraphs (c) and (d) of this section, each final-stage manufacturer, as defined in § 568.3 of Title 49 of the Code of Federal Regulations, of a vehicle manufactured in two or more stages shall affix to each vehicle a label, of the type and in the manner and form described in § 567.4 of this part, containing the following statements:

(1) Name of final-stage manufacturer, preceded by the words "MANUFACTURED BY" or "MFD BY."

(2) Month and year in which final-stage manufacturer is completed. This may be spelled out as "JUNE 1970" or expressed in numerals as "6/70." No preface is required.

(3) Name of original manufacturer of the incomplete vehicle, preceded by the words "INCOMPLETE VEHICLE MANUFACTURED BY" or "INC VEH MFD BY."

(4) Month and year in which the original manufacturer of the incomplete vehicle performed his last manufacturing operation on the incomplete vehicle, in the same form as (2) above.

[(5) "GROSS VEHICLE WEIGHT RATING" or "GVWR" followed by the appropriate value in pounds, which shall not be less than the sum of the unloaded vehicle weight, rated cargo load, and 150 pounds times the vehicle's designated seating capacity. However, for school buses the minimum occupant weight allowance shall be 120 pounds. (36 F.R. 23571—December 10, 1971. Effective:January 1, 1972)]

(6) "GROSS AXLE WEIGHT RATING" or "GAWR," followed by the appropriate value in pounds for each axle identified in order from front to rear (*e.g.*, front, first intermediate, second intermediate, rear).

(7) The statement: "THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL

MOTOR VEHICLE SAFETY STANDARDS IN EFFECT IN [month, year]." The date shown shall be no earlier than the manufacturing date of the incomplete vehicle, and no later than the date of completion of final-stage manufacture.

[(8) "VEHICLE IDENTIFICATION NUMBER" (36 F.R. 19593—October 8, 1971)]

(9) The type classification of the vehicle as defined in § 571.3 of Title 49 of the Code of Federal Regulations (*e.g.*, truck, MPV, bus, trailer.)

[(b) More than one set of figures for GVWR and GAWR, and one or more tire sizes, may be listed in satisfaction of the requirements of paragraphs (a)(5) and (6) of this section, as provided in § 567.4(h). (37 F.R. 13696—July 13, 1972. Effective 7/13/72)]

(c) If an incomplete vehicle manufacturer assumes legal responsibility for all duties and liabilities imposed by the Act, with respect to the vehicle as finally manufactured, the incomplete vehicle manufacturer shall ensure that a label is affixed to the final vehicle in conformity with paragraph (a) of this section, except that the name of the incomplete vehicle manufacturer shall appear instead of the name of the final-stage manufacturer after the words "MANUFACTURED BY" or "MFD BY" required by subparagraph (a)(1) of this section, the additional manufacturer's name required by subparagraph (a)(3) of this section shall be omitted, and the date required by subparagraph (a)(4) of this section shall be preceded by the words "INCOMPLETE VEHICLE MANUFACTURED" or "INC VEH MFD."

(d) If an intermediate manufacturer of a vehicle assumes legal responsibility for all duties and liabilities imposed on manufacturers by the Act, with respect to the vehicle as finally manufactured, the intermediate manufacturer shall ensure that a label is affixed to the final vehicle in conformity with paragraph (a) of this section, except that the name of the intermediate manufacturer shall appear instead of the name of the final-stage manufacturer after the words "MANUFACTURED BY" or "MFD BY" required by subparagraph (a)(1) of this section.

§ 567.6 [Requirements for persons who do not alter certified vehicles or do so with readily attachable components. A person who does not alter a motor vehicle or who alters such a vehicle only by the addition, substitution, or removal of readily attachable components such as mirrors or tire and rim assemblies, or minor finishing operations such as painting, in such a manner that the vehicle's stated weight ratings are still valid, need not affix a label to the vehicle, but shall allow a manufacturer's label that conforms to the requirements of this part to remain affixed to the vehicle. If such a person is a distributor of the motor vehicle, allowing the manufacturer's label to remain affixed to the vehicle shall satisfy the distributor's certification requirements under the Act. (38 F.R. 15961—June 19, 1973. Effective: 2/1/74)]

[**§ 567.7 Requirements for persons who alter certified vehicles.** A person who alters a vehicle that has previously been certified in accordance with § 567.4 or § 567.5, other than by the addition, substitution, or removal of readily attachable components such as mirrors or tire and rim assemblies, or minor finishing operations such as painting, or who alters the vehicle in such a manner that its stated weight ratings are no longer valid, before the first purchase of the vehicle in good faith for purposes other than resale, shall allow the original certification label to remain on the vehicle, and shall affix to the vehicle an additional label of the type and in the manner and form described in § 567.4, containing the following information:

(a) The statement: "This vehicle was altered by (individual or corporate name) in (month and year in which alterations were completed) and as altered it conforms to all applicable Federal Motor Vehicle Safety Standards in effect in (month, year)." The second date shall be no earlier than the manufacturing date of the original vehicle, and no later than the date alterations were completed.

(b) If the gross vehicle weight rating or any of the gross axle weight ratings of the vehicle as altered are different from those shown on the original certification label, the modified values shall be provided in the form specified in §§ 567.4(g)(3) and (4).

(c) If the vehicle as altered has a different type classification from that shown on the original certification label, the type as modified shall be provided. (38 F.R. 15961—June 19, 1973. Effective: 2/1/74)]

36 F.R. 7054
April 14, 1971

Part 571.108 - Lamps, Reflective Devices and Associated Equipment

RULES AND REGULATIONS

Title 49—Transportation

CHAPTER V—NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket No. 69-19; Notice 15]

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Republication of Lighting Standard

This notice republishes in its entirety 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, Lamps, Reflective Devices, and Associated Equipment.

Since Standard No. 108 was last reissued (36 FR 22902, December 2, 1971), it has been amended approximately 29 times. The republication will insure that the public is afforded a current and convenient copy of a complex motor vehicle safety standard. Amendments to this standard published in the FEDERAL REGISTER are therefore reflected in the reissuance, and have been incorporated through August 1, 1976.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108 is republished to read as set forth below.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718; 15 U.S.C. 1392, 1407); delegations of authority at 49 CFR 1.50 and 49 CFR 501.8.)

Issued on August 16, 1976.

ROBERT L. CARTER,
Associate Administrator, Motor Vehicle Programs.

§ 571.108 Standard No. 108; Lamps, reflective devices, and associated equipment.

S1. *Purpose and scope.* This standard specifies requirements for original and replacement lamps, reflective devices, and associated equipment necessary for signaling and for the safe operation of motor vehicles during darkness and other conditions of reduced visibility.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers (except pole trailers and trailer converter dollies), and motorcycles, and to lamps, reflective devices, and associated equipment for replacement of like equipment on vehicles to which this standard applies.

S3. *Definitions.* "Flash" means a cycle of activation and deactivation of a lamp by automatic means continuing until stopped either automatically or manually.

"Speed attainable in 1 mile" means the speed attainable by accelerating at maximum rate from a standing start for 1 mile on a level surface.

S4. *Requirements.*

S4.1 *Required motor vehicle lighting equipment.*

S4.1.1 Except as provided in succeeding paragraphs of S4.1.1, each vehicle shall be equipped with at least the number of lamps, reflective devices, and associated equipment specified in Tables I and III, as applicable. Required equipment shall be designed to conform to the SAE Standards or Recommended Practices referenced in those tables. Table I applies to multipurpose passenger vehicles, trucks, trailers, and buses, 80 or more inches in overall width. Table III applies to passenger cars and motorcycles and to multipurpose passenger vehicles, trucks, trailers, and buses, less than 80 inches in overall width.

S4.1.1.1 A truck tractor need not be equipped with turn signal lamps mounted on the rear if the turn signal lamps at or near the front are so constructed (double-faced) and so located that they meet the requirements for double-faced turn signals specified in SAE Standard J588e, "Turn Signal Lamps," September 1970.

S4.1.1.2 A truck tractor need not be equipped with any rear side marker devices, rear clearance lamps, and rear identification lamps.

S4.1.1.3 Intermediate side marker devices are not required on vehicles less than 30 feet in overall length.

S4.1.1.4 Reflective material conforming to Federal Specification L-S-300, "Sheeting and Tape, Reflective; Nonexposed Lens, Adhesive Backing," September 7, 1965, may be used for side reflex reflectors if this material, as used on the vehicle, meets the performance standards in Table I of SAE Standard J594d, "Reflex Reflectors," March 1967.

S4.1.1.5 The turn signal operating unit on each passenger car, and multipurpose passenger vehicle, truck, and bus less than 80 inches in overall width manufactured on or after January 1, 1973, shall be self-can-

celing by steering wheel rotation and capable of cancellation by a manually operated control.

S4.1.1.6 Each stop lamp on any motor vehicle manufactured between January 1, 1973, and September 1, 1978, may be designed to conform to SAE Standard J586b, *Stop Lamps*, June 1966. It shall meet the photometric minimum candlepower requirements for class A red turn signal lamps specified in SAE Standard J575d, *Test for Motor Vehicle Lighting Devices and Components*, August 1967. Each such lamp on a passenger car and on a multipurpose passenger vehicle, truck, trailer or bus less than 80 inches in overall width shall have an effective projected luminous area not less than 3½ square inches. If multiple compartment lamps or multiple lamps are used, the effective projected luminous area of each compartment or lamp shall be not less than 3½ square inches; however, the photometric requirements may be met by a combination of compartments or lamps.

S4.1.1.7 Each turn signal lamp on any motor vehicle, except motorcycles, manufactured between January 1, 1972, and September 1, 1978, may be designed to conform to SAE Standard J588d, *Turn Signal Lamps*, June 1966, and shall meet the photometric minimum candlepower requirements for Class A turn signal lamps specified in SAE Standard J575d, *Tests, for Motor Vehicle Lighting Devices and Components*, August 1967. Each such lamp on a passenger car and on a multipurpose passenger vehicle, truck, trailer or bus less than 80 inches in overall width shall have an effective projected luminous area not less than 3½ square inches. If multiple compartment lamps or multiple lamps are used, the effective projected luminous area of each compartment or lamp shall be not less than 3½ square inches; however, the photometric requirements may be met by a combination of compartments or lamps. Each such lamp on a multipurpose passenger vehicle, truck, trailer or bus 80 inches or more in overall width shall have an effective projected luminous area not less than 12 square inches.

S4.1.1.8 For each passenger car, and each multipurpose passenger vehicle, truck, trailer, and bus of less than 80 inches in overall width the photometric minimum candlepower requirements for side marker lamps specified in SAE Standard J592e "Clearance, Side Marker, and Identification Lamps," July 1972, may be met for all inboard test points at a distance of 15 feet from the vehicle and on a vertical plane that is perpendicular to the longitudinal axis of the vehicle and located midway between the front and rear side marker lamps.

S4.1.1.9 Boat trailers need not be equipped with both front and rear clearance lamps provided an amber (to front) and red (to rear) clearance lamp is located at or near the midpoint on each side of the trailer so as to indicate its extreme width.

S4.1.1.10 Multiple license plate lamps and backup lamps may be used to fulfill the requirements of the SAE Standards applicable to such lamps referenced in Tables I and III.

S4.1.1.11 A parking lamp is not required to meet the minimum photometric values at each test point specified in Table I of SAE Standard J222, "Parking Lamps (Position Lamps)," if the sum of the candlepower measured at the test points within the groups listed in Figure 1 is not less than the sum of the candlepower values for such test points specified in J222.

S4.1.1.12 A taillamp, stop lamp, or turn signal lamp is not required to meet the minimum photometric values at each test point specified in the referenced SAE Standards, if the sum of the candlepower measured at the test points is not less than that specified for each group listed in Figure 1, or for motorcycle turn signal lamps, not less than one-half of such sum.

Group totals, CP

Groups	Test points degrees	Parking lamps	Tail lamps			Red stop and turn signal lamps			Yellow turn signal lamps		
			One	Two	Three	One	Two	Three	One	Two	Three
1	20L–5U 20L–H 20L–5D 10L–10U 10L–10D	2.8	1.6	2.7	3.8	55	66	80	135	165	190
2	10U–V 5U–10L 5U–10R	2.4	2.1	3.6	5.5	85	100	115	210	251	290
3	10L–H 5L–5U 5L–5D	4.2	3.4	5.3	3.0	140	167	195	350	420	490
4	5U–V H–5L H–V H–5R 5D–V	16.8	9.6	16.5	24.0	380	449	520	950	1,130	1,295
5	5R–5U 5R–5D 10R–H	4.2	3.4	5.3	3.0	140	167	195	350	420	490
6	5D–10L 5D–10R 10D–V	2.4	2.1	3.6	5.5	85	100	115	210	251	290
7	10R–10U 10R–10D 20R–5U 20R–H 20R–5D	2.8	1.6	2.7	3.8	55	66	80	135	165	190
Maximum rear lamps only			15	20	25	300	360	420	900	900	900

FIGURE 1 — Grouped photometric minimum candlepower requirements for devices using one, two, or three separately lighted compartments, or for one, two, or three lamps used in a single design location to perform a single function.

S4.1.1.13 [Reserved]
S4.1.1.14 [Reserved]
S4.1.1.15 [Reserved]

S4.1.1.16 All passenger cars and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width shall be equipped with turn signal operating units designed to complete a durability test of 100,000 cycles.

S4.1.1.17 A trailer that is less than 30 inches in overall width may be equipped with only one of each of the following lamps and reflective devices, located at or near its vertical centerline: Tail lamp, stop lamp, and near reflex reflector.

S4.1.1.18 A trailer that is less than 6 feet in overall length, including the trailer tongue, need not be equipped with front side marker lamps and front side reflex reflectors.

S4.1.1.19 A lamp manufactured on or after January 1, 1974, and designed to use a type of bulb that has not been assigned a mean spherical candlepower rating by its manufacturer and is not listed in SAE Standard J573d, "Lamp Bulbs and Sealed Units," December 1968, shall meet the applicable requirements of this standard when used with any bulb of the type specified by the lamp manufacturer, operated at the bulb's design voltage. A lamp that contains a sealed-in bulb shall meet these requirements with the bulb operated at the bulb's design voltage.

S4.1.1.20 Except for a lamp having a sealed-in bulb, a lamp manufactured on or after January 1, 1974 shall meet the applicable requirements of this standard when tested with a bulb whose filament is positioned within ±.010 inch of the nominal design position specified in SAE Standard J573d, "Lamp Bulbs and Sealed Units," December 1968, or specified by the bulb manufacturer.

S4.1.1.21 Instead of a headlighting system of two Type 1 headlamps and two Type 2, 5¾-inch headlamps, a vehicle manufactured on or after January 1, 1974 may be equipped with a headlighting system of two Type 2A headlamps, that meet the following requirements.

(a) Each Type 1A headlamp and Type 2A headlamp shall be designed to conform to the requirements for a Type 1 headlamp and Type 2, 5¾-inch headlamp respectively, as specified in any SAE Standard or Recommended Practice, referenced or subreferenced by Tables I and III, except as provided below.

(b) Each Type 1A and Type 2A headlamp shall be designed to conform to the applicable dimensional requirements and specifications of Figure 2. At a voltage of 12.8 volts, the maximum design wattage with an allowable tolerance of plus 7.5 percent shall be 50 watts for a Type 1A headlamp and 60 watts for each filament of a Type 2A headlamp.

(c) The following SAE Standards and Recommended Practices or portions thereof, do not apply:

(i) SAE Standard J571b, "Dimensional Specifications for Sealed Beam Headlamp Units," April 1965.

(ii) SAE Standard J573d, "Lamp Bulbs and Sealed Units," December 1968.

(iii) Figure 1, SAE Recommended Practice J602, "Headlamp Aiming Device for Mechanically Aimable Sealed Beam Headlamp Units," August 1963.

(iv) Paragraph 2 of "Retaining Ring Requirements," and the paragraph "Proper Seating of Sealed Beam Unit," SAE Standard J580a, "Sealed Beam Headlamp," June 1966.

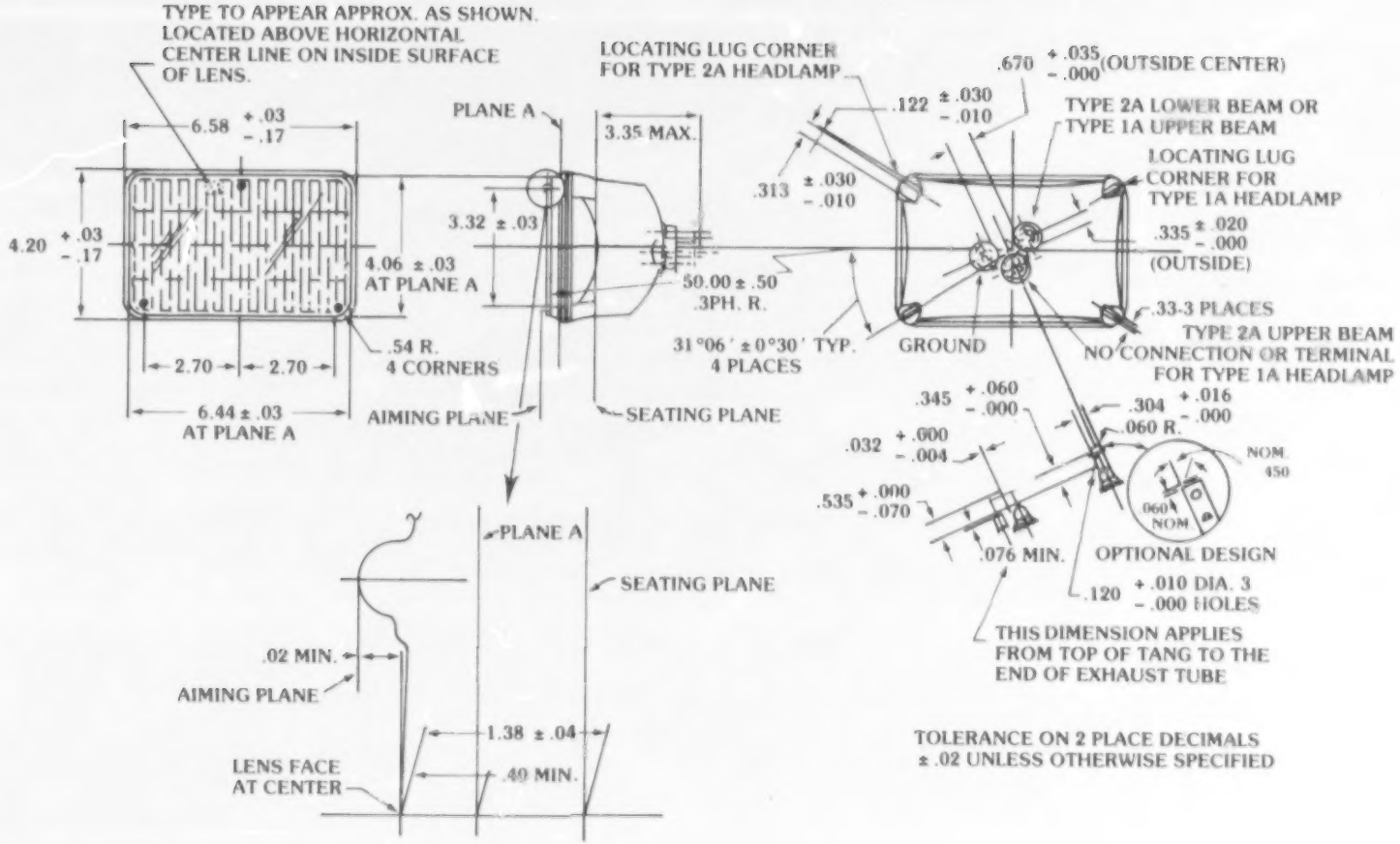

TYPE TO APPEAR APPROX. AS SHOWN. LOCATED ABOVE HORIZONTAL CENTER LINE ON INSIDE SURFACE OF LENS.
6.58 +.03 -.17
4.20 +.03 -.17
4.06 ± .03 AT PLANE A
3.32 ± .03
PLANE A
3.35 MAX.
2.70
2.70
.54 R. 4 CORNERS
6.44 ± .03 AT PLANE A
AIMING PLANE
SEATING PLANE
LOCATING LUG CORNER FOR TYPE 2A HEADLAMP
.313 ± .030 -.010
.122 ± .030 -.010
.670 +.035 -.000 (OUTSIDE CENTER)
TYPE 2A LOWER BEAM OR TYPE 1A UPPER BEAM
LOCATING LUG CORNER FOR TYPE 1A HEADLAMP
.335 ± .020 -.000 (OUTSIDE)
50.00 ± .50 .3PH. R.
31°06' ± 0°30' TYP. 4 PLACES
GROUND
.33-3 PLACES
TYPE 2A UPPER BEAM NO CONNECTION OR TERMINAL FOR TYPE 1A HEADLAMP
.345 +.060 -.000
.304 +.016 -.000
.060 R.
.032 +.000 -.004
.535 +.000 -.070
NOM. 45°
.076 MIN.
OPTIONAL DESIGN
.120 +.010 DIA. 3 -.000 HOLES
THIS DIMENSION APPLIES FROM TOP OF TANG TO THE END OF EXHAUST TUBE
PLANE A
SEATING PLANE
.02 MIN.
AIMING PLANE
1.38 ± .04
.40 MIN.
LENS FACE AT CENTER
TOLERANCE ON 2 PLACE DECIMALS ± .02 UNLESS OTHERWISE SPECIFIED

FIGURE 2
RECTANGULAR HEADLAMP SPECIFICATIONS

S4.1.1.22 A backup lamp is not required to meet the minimum photometric values at each test point specified in Table I of SAE Standard J593c "Backup Lamps" if the sum of the candlepower measured at the test points within each group listed in Figure 3 is not less than the group totals specified in that figure.

FIGURE 3 — MINIMUM LUMINOUS INTENSITY REQUIREMENTS FOR BACKUP LAMPS

Group	Test point, degrees	Totals for group, candela (see note 1)
1[1]	45L-5U 45L-H 45L-5D	45
2[1]	30L-H 30L-5D	50
3	10L-10U 10L-5U V-10U V-5U 10R-10U 10R-5U	100
4	10L-H 10L-5D V-H V-5D 10R-H 10R-5D	360
5[1]	30R-H 30R-5D	50
6[1]	45R-5U 45R-H 45R-5D	45

[1]When 2 lamps of the same or symmetrically opposite design are used, the reading along the vertical axis and the averages of the readings for the same angles left and right of vertical for 1 lamp shall be used to determine compliance with the requirements. If 2 lamps of differing designs are used, they shall be tested individually and the values added to determine that the combined units meet twice the candela requirements.

When only 1 backup lamp is used on the vehicle, it shall be tested to twice the candela requirements.

S4.1.1.23 Variable load turn signal flashers shall comply with voltage drop and durability requirements with the maximum design load connected and shall comply with starting time, flash rate, and percent current "on" time requirements both with the minimum and with the maximum design load connected.

S4.1.1.24 The lowest voltage drop for turn signal flashers and hazard warning signal flashers measured between the input and load terminals shall not exceed 0.8 volt.

S4.1.1.25 The only required equipment for mobile structure trailers is stoplamps, taillamps, rear reflex reflectors, and turn signal lamps.

S4.1.1.26 A motor-driven cycle whose speed attainable in 1 mile is 30 mph or less need not be equipped with turn signal lamps.

S4.1.1.27 A motor-driven cycle whose speed attainable in 1 mile is 30 mph or less may be equipped with a stop lamp whose photometric output for the groups of test points specified in Figure 1 is at least one-half of the minimum values set forth in that figure.

S4.1.1.28 Each taillamp on any motor vehicle manufactured before September 1, 1978, may be designed to conform to SAE Standard J585c, *Tail Lamps*, June 1966.

S4.1.1.29 Each turn signal lamp on a motorcycle manufactured between January 1, 1973, and September 1, 1978, may be designed to conform to SAE Standard J588d, *Turn Signal Lamps*, June 1966.

S4.1.1.30 Except as provided in paragraph S4.1.1.12 of this standard, each turn signal lamp on a motorcycle shall meet one-half of the minimum photometric values at each test point specified for Class A turn signal lamps in SAE Standard J575d, *Tests for Motor Vehicle Lighting Devices and Components*, August 1967, or in SAE Standard J588e, *Turn Signal Lamps*, September 1970, as applicable.

S4.1.1.31 Each turn signal lamp on a motorcycle manufactured on and after January 1, 1973, shall have an effective projected luminous area not less than 3½ square inches.

S4.1.1.32 Note 6 of Table 1 in SAE Standard J588e, *Turn Signal Lamps*, September 1970, does not apply. A stop lamp that is not optically combined with a turn signal lamp shall remain activated when the turn signal is flashing.

S4.1.1.33 Headlamps may conform to SAE Standard J579c, *Sealed Beam Headlamp Units*

for Motor Vehicles, December 1974, except that:

(a) In Table I of SAE Standard J579c, the maximum candela at any test point shall not exceed 37,500;

(b) In Table II of SAE Standard J579c, the combined maximum candela at any test point shall not exceed 37,500; and

(c) At a voltage of 12.8 volts, the maximum design wattage, with an allowable tolerance of plus 7.5 percent, shall be as follows: 50 watts for Type 1 (5¾-inch); 37.5 watts for Type 2 (5¾-inch) high beam; and 60 watts for Type 2 (5¾-inch) low beam, Type 2 (7-inch) low beam, and Type 2 (7-inch) high beam.

S4.1.2 Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576c, May 1970, except that:

(a) Plastic materials manufactured before January 1, 1976, may conform to SAE J576b, August 1966;

(b) Plastic lenses used for inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.4 and 4.2 of SAE J576b, or J576c, as applicable, when covered by the outer lens or other material;

(c) After the outdoor exposure test, the haze and loss of surface luster of plastic materials used for lamp lenses shall not be greater than 30 percent haze as measured by ASTM-1003-61, "Haze and Luminous Transmittance of Transparent Plastic;" and

(d) After the outdoor exposure test, plastic materials used for reflex reflectors shall meet the appearance requirements of paragraph 4.2.2 of SAE J576b or J576c as applicable.

S4.1.3 No additional lamp, reflective device, or other motor vehicle equipment shall be installed that impairs the effectiveness of lighting equipment required by this standard.

S4.1.4 Each school bus shall be equipped with a system of either:

(a) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and installed in accordance with that standard; or

(b) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and four amber signal lamps designed to conform to that standard, except for their color, and except that their candlepower shall be at least 2½ times that specified for red signal lamps. Both red and amber lamps shall be installed in accordance with SAE Standard J887, except that:

(i) Each amber signal lamp shall be located near each red signal lamp, at the same level, but closer to the vertical centerline of the bus; and

(ii) The system shall be wired so that the amber signal lamps are activated only by manual or foot operation, and if activated, are automatically deactivated and the red signal lamps automatically activated when the bus entrance door is opened.

S4.1.5 The color in all lighting equipment covered by this standard shall be in accordance with SAE Standard J573a, April 1965, "Color Specification for Electric Signal Lighting Devices".

S4.2 *Other requirements.*

S4.2.1 The words "it is recommended that," "recommendations," or "should be" appearing in any SAE Standard or Recommended Practice referenced or subreferenced in this standard shall be read as setting forth mandatory requirements, except that the aiming pads on the lens face and the black area surrounding the signal lamp, recommended in SAE Standard J887, "School Bus Red Signal Lamps," July 1964, are not required.

S4.3 *Location of required equipment.*

S4.3.1 Except as provided in S4.3.1.1 through S4.3.1.8, each lamp, reflective device, and item of associated equipment shall be securely mounted on a rigid part of the vehicle other than glazing that is not designed to be removed except for repair, in accordance with the requirements of Table I or III and in locations specified in Table II (multipurpose passenger vehicles, trucks, trailers, and buses 80 or more inches in overall width) or Table IV (all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, trailers, and buses less than 80 inches in overall width), as applicable.

S4.3.1.1 Except as provided in S4.3.1.1.1, each lamp and reflective device shall be located so that it meets the visibility requirements specified in any applicable SAE Standard or Recommended Practice. In addition, no part of the vehicle shall prevent a parking lamp, taillamp, stop lamp, turn signal lamp, or backup lamp from meeting its photometric output at any applicable group of test points specified in Figures 1 and 3, or prevent any other lamp from meeting the photometric output at any test point specified in any applicable SAE Standard or Recommended Practice. However, if motor vehicle equipment (e.g., mirrors, snow plows, wrecker booms, backhoes, and winches) prevents compliance with this paragraph by any required lamp or reflective device, an auxiliary lamp or device

meeting the requirements of this paragraph shall be provided.

S4.3.1.1.1 Clearance lamps may be mounted at a location other than on the front and rear if necessary to indicate the overall width of a vehicle, or for protection from damage during normal operation of the vehicle, and at such a location they need not be visible at 45 degrees inboard.

S4.3.1.2 On a truck tractor, the red rear reflex reflectors may be mounted on the back of the cab, at a minimum height not less than 4 inches above the height of the rear tires.

S4.3.1.3 On a trailer, the amber front side reflex reflectors and amber front side marker lamps may be located as far forward as practicable exclusive of the trailer tongue.

S4.3 1.4 When the rear identification lamps are mounted at the extreme height of a vehicle, rear clearance lamps need not meet the requirement of Table II that they be located as close as practicable to the top of the vehicle.

S4.3.1.5 The center of the lens referred to in SAE Standard J593c, "Backup Lamps," February 1968, is the optical center.

S4.3.1.6 On a truck tractor, clearance lamps mounted on the cab may be located to indicate the width of the cab, rather than the overall width of the vehicle.

S4.3.1.7 The requirement that there be not less than 4 inches between a front turn signal lamp and a low beam headlamp, specified in SAE Standard J588e, "Turn Signal Lamps," September 1970, shall not apply if the sum of the candlepower values of the turn signal lamp measured at the test points within each group listed in Figure 1 is not less than two and one-half

TABLE I – REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

Item	Multipurpose passenger vehicles, trucks, and buses	Trailers	Applicable SAE standard or recommended practice
Headlamps	2 white, 7-inch, Type 2 headlamp units; or 2 white, 5¾-inch, Type 1 headlamp units and 2 white 5¾-inch, Type 2 headlamp units.	None	J580a, June 1966; J579a, August 1965; and J566, January 1960.
Taillamps	2 red	2 red	J585d, August 1970.
Stoplamps	2 red[1]	2 red[1]	J586c, August 1970.
License plate lamp	1 white[2]	1 white[1]	J587d, March 1969.
Reflex reflectors	4 red; 2 amber[3]	4 red; 2 amber	J594e, March 1970.
Side marker lamps	2 red; 2 amber[4]	2 red; 2 amber	J592e, July 1972.
Backup lamp	1 white[4]	None	J593c, February 1968.
Turn signal lamps	2 red or amber; 2 amber[3]	2 red or amber	J588e, September 1970.
Turn signal operating unit	1	None	J589, April 1964.
Turn signal flasher	1[5]	None	J590b, October 1965.
Vehicular hazard warning signal operating unit.	1	None	J910, January 1966.
Vehicular hazard warning signal flasher.	1[5]	None	J945, February 1966.
Identification lamps	3 amber; 3 red[3]	3 red	J592e, July, 1972.
Clearance lamps	2 amber; 2 red[6]	2 amber, 2 red	J592e, July 1972.
Intermediate side marker lamps.	2 amber[4]	2 amber[4]	J592e, July 1972.
Intermediate reflex reflectors.	2 amber[4]	2 amber[4]	J594e, March 1970.

[1]See S4.1.1.6. [2]See S4.1.1.10. [3]See S4.5.6. [4]See S4.1.1.3. [5]See S4.4.2. [6]See S4.1.1.2.

times the sum specified for each group for yellow turn signal lamps.

S4.4 *Equipment combinations.*

S4.4.1 Two or more lamps, reflective devices, or items of associated equipment may be combined if the requirements for each lamp, reflective device, and item of associated equipment are met, except that no clearance lamp may be combined optically with any taillamp or identification lamp.

S4.5 *Special wiring requirements.*

S4.5.1 Each vehicle shall have a means of switching between lower and upper headlamp beams that conforms to SAE Recommended Practice J564a, "Headlamp Beam Switching," April 1964 or to SAE Recommended Practice J565b, "Semi-Automatic Headlamp Beam Switching Devices," February 1969.

S4.5.2 Each vehicle shall have a means for indicating to the driver when the upper beams of the headlamps are on that conforms to SAE Recommended Practice J564a, April 1964, except that the signal color need not be red.

S4.5.3 The taillamps on each vehicle shall be activated when the headlamps are activated in a steady-burning state.

S4.5.4 The stoplamps on each vehicle shall be activated upon application of the service brakes.

S4.5.5 The vehicular hazard warning signal operating unit on each vehicle shall operate independently of the ignition or equivalent switch, and when activated, shall cause to flash simultaneously sufficient turn signal lamps to meet, as a minimum, the turn signal lamp photometric requirements of this standard.

S4.5.6 Each vehicle equipped with a turn signal operating unit shall also have an illuminated pilot indicator. Failure of one or more turn signal lamps to operate shall be indicated in accordance with SAE Standard J588e, "Turn Signal Lamps," September 1970, except where a variable-load turn signal flasher is used on a truck, bus, or multipurpose passenger vehicle 80 or more inches in overall width, on a truck that is capable of accommodating a slide-in camper, or on any vehicle equipped to tow trailers.

S4.5.7 On all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width:

(a) When the parking lamps are activated, the taillamps, license plate lamps, and side marker lamps shall also be activated; and

(b) When the headlamps are activated in a steady-burning state, the taillamps, parking lamps, license plate lamps and side marker lamps shall also be activated.

S4.6 When activated:

(a) Turn signal lamps, hazard warning signal lamps, and school bus warning lamps shall flash; and

(b) All other lamps shall be steady-burning, except that means may be provided to flash headlamps and side marker lamps for signaling purposes.

S4.7 *Replacement Equipment.*

S4.7.1 Each lamp, reflective device, or item of associated equipment manufactured to replace any lamp, reflective device, or item of associated equipment on any vehicle to which this standard applies, shall be designed to conform with this standard.

S4.7.2 Each lamp, reflective device, or item of associated equipment to which section S4.7.1 applies may be labeled with the symbol DOT, which shall constitute a certification that it conforms to applicable Federal motor vehicle safety standards.

S5. *Subreferenced SAE Standards and Recommended Practices.*

S5.1 SAE Standards and Recommended Practices subreferenced by the SAE Standards and Recommended Practices included in Tables I and III and paragraphs S4.1.4 and S4.5.1 are those published in the 1970 edition of the SAE Handbook, except that the SAE Standard referred to as "J599" is J599c, *Lighting Inspection Code,* March 1973, and the subreferenced SAE Standard referred to as "J575" is J575e, *Tests for Motor Vehicle Lighting Devices and Components,* August 1970, for tail lamps, stop lamps, and turn signal lamps designed to conform to SAE Standard J585d, J586c, and J588e respectively.

S5.2 Requirements of SAE Standards incorporated by reference in this standard, other than J576b and J576c, do not include tests for warpage of devices with plastic lenses.

TABLE II – LOCATION OF REQUIRED EQUIPMENT MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

Item	Location on—		Height above road surface measured from center of item on vehicle at curb weight
	Multipurpose passenger vehicles, trucks, and buses	Trailers	
Headlamps	Type 1 headlamps at the same height, 1 on each side of the vertical centerline; Type 2 headlamps at the same height, 1 on each side of the vertical centerline; as far apart as practicable.	Not required	Not less than 24 inches, nor more than 54 inches.
Taillamps	On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable.	On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable.	Not less than 15 inches, nor more than 72 inches.
Stoplamps	On the rear, one on each side of the vertical centerline, at the same height, and as far apart as practicable.	On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable.	Not less than 15 inches, nor more than 72 inches.
License plate lamp.	At rear license plate, to illuminate the plate from the top or sides.	At rear license plate, to illuminate the plate from the top or sides.	No requirement.
Backup lamp	On the rear	Not required	No requirement.
Turn signal lamps.	At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable. On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable.	On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable.	Not less than 15 inches, nor more than 83 inches.
Identification lamps.	On the front and rear—3 lamps, amber in front, red in rear, as close as practicable to the top of the vehicle, at the same height, as close as practicable to the vertical centerline, with lamp centers spaced not less than 6 inches or more than 12 inches apart.	On the rear—3 lamps as close as practicable to the top of the vehicle at the same height, as close as practicable to the vertical centerline, with lamp centers spaced not less than 6 inches or more than 12 inches apart.	No requirement.

TABLE II – LOCATION OF REQUIRED EQUIPMENT MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH (CONTINUED)

Item	Location on—		Height above road surface measured from center of item on vehicle at curb weight
	Multipurpose passenger vehicles, trucks, and buses	Trailers	
Clearance lamps.	On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top as practicable.[1]	On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top thereof as practicable.[2][3][4]	No requirement.
Intermediate side marker lamps.	On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps.	On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps.	Not less than 15 inches.
Intermediate side reflex reflectors.	On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors.	On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors.	Not less than 15 inches nor more than 60 inches.
Reflex reflectors.	On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height.[3]	On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height.	Not less than 15 inches nor more than 60 inches.
	On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	
Side marker lamps.	On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	Not less than 15 inches.

[1] See S4.3.1.6.
[2] See S4.3.1.2.
[3] See S4.3.1.4.
[4] See S4.1.1.9.

TABLE III – REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH

Item	Passenger cars, multipurpose passenger vehicles, trucks, and buses	Trailers	Motorcycles	Applicable SAE standard or recommended practice
Headlamps	2 white, 7-inch, Type 2 headlamp units, or 2 white, 5¾-inch, Type 1 headlamp units and 2 white, 5¾-inch, Type 2 headlamp units.			J580a, June 1966, J579a, August 1965, and J566, January 1960.
			1white	J584, April 1964 and J566, January 1960.
Taillamps	2 red	2 red[14]	1 red	J585d, August 1970.
Stoplamps	2 red[1, 8]	2 red[1, 14]	1 red[1]	J586c, August 1970.
License plate lamp	1 white[3]	1 white[3]	1 white[3]	J587d, March 1969.
Parking lamps	2 amber or white[4]	None	None	J222, December 1970.
Reflex reflectors	4 red; 2 amber[3]	4 red; 2 amber[11, 12]	3 red; 2 amber	J594e, March 1970.
Intermediate side reflex reflectors.	2 amber[9]	2 amber[9]	None	J594e, March 1970.
Intermediate side marker lamps.	2 amber[9]	2 amber[9]	None	J592e, July 1972.
Side marker lamps	2 red; 2 amber[3]	2 red; 2 amber[13]	None	J592e, July 1972.
Backup lamp	1 white[3, 11]	None	None	J593e, July 1972.
Turn signal lamps	2 red or amber; 2 amber[13]	2 red or amber	2 amber, 2 red or amber[7, 13]	J588e, September 1970.
Turn signal operating unit.	1[7, 8, 10]	None	1[13]	J589, April 1964.
Turn signal flasher	1[5]	None	1[13]	J590b, October 1965.
Vehicular hazard warning signal operating unit.	1	None	None	J910, January 1966.
Vehicular hazard warning signal flasher.	1[6]	None	None	J945, February 1966.

[1]See S4.1.1.6.
[2]See S4.1.1.7.
[3]See S4.1.1.10.
[4]See S4.1.1.11.
[5]See S4.1.1.2.
[6]See S4.4.2.
[7]See S4.5.6.
[8]See S4.1.1.5
[9]See S4.1.1.3.
[10]See S4.1.1.15.
[11]See S4.1.1.17.
[12]See S4.1.1.18.

TABLE IV – LOCATION OF REQUIRED EQUIPMENT ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES OF LESS THAN 80 INCHES OVERALL WIDTH

Item	Location on		Height above road surface measured from center of item on vehicle at curb weight
	Passenger cars, multipurpose passenger vehicles, trucks, trailers, and buses	Motorcycles	
Column 1	Column 2	Column 3	Column 4
Headlamps	Type 1 headlamps at the same height, 1 on each side of the vertical centerline; Type 2 headlamps at the same height 1 on each side of the vertical centerline; as far apart as practicable.	On the vertical centerline, except that if two are used, they shall be symmetrically disposed about the vertical centerline.	Not less than 24 inches, nor more than 54 inches.
Taillamps	On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable.[1]	On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline.	Not less than 15 inches, nor more than 72 inches.
Stoplamps	On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable.[1]	On the rear—on the vertical centerline except that if two are used they shall be symmetrically disposed about the vertical centerline.	Not less than 15 inches, nor more than 72 inches.
License plate lamp.	At rear license plate, to illuminate the plate from the top or sides.	At rear license plate	No requirement.
Parking lamps.	On the front—1 on each side of the vertical centerline, at the same height, and as far apart as practicable.	Not required	Not less than 15 inches, nor more than 72 inches.
Reflex reflectors.	On the rear—1 red on each side of the vertical centerline, at the same height, and as far apart as practicable.[1] On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.[1]	On the rear—1 red on the vertical centerline except that, if two are used on the rear, they shall be symmetrically disposed about the vertical centerline. On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	Not less than 15 inches, nor more than 60 inches.

continued

[1] See 4.1.1.18.

TABLE IV – LOCATION OF REQUIRED EQUIPMENT ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES OF LESS THAN 80 INCHES OVERALL WIDTH (CONTINUED)

Item	Location on		Height above road surface measured from center of item on vehicle at curb weight
	Passenger cars, multipurpose passenger vehicles, trucks, trailers, and buses	Motorcycles	
Column 1	Column 2	Column 3	Column 4
Backup lamp	On the rear	Not required	No requirement.
Turn signal lamps.[1]	At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable. On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable.	At or near the front—1 amber on each side of the vertical centerline at the same height, and having a minimum horizontal separation distance (centerline of lamps) of 16 inches. Minimum edge to edge separation distance between lamp and headlamp is 4 inches. At or near the rear—1 red or amber on each side of the vertical centerline, at the same height and having a minimum horizontal separation distance (centerline to centerline of lamps) of 9 inches. Minimum edge to edge separation distance between lamp and tail or stop lamp is 4 inches.	Not less than 15 inches, nor more than 83 inches.
Side marker lamps.	On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	Not required	Not less than 15 inches.
Intermediate side marker lamps.	On each side—1 amber located at or near the midpoint between the front and rear side marker lamps.	Not required	Not less than 15 inches.
Intermediate side marker reflectors.	On each side—1 amber located at or near the midpoint between the front and rear side marker reflectors.	Not required	Not less than 15 inches, nor more than 60 inches.

[1]Front turn signal lamps not required for trailers.

NOTE: (1) The term "overall width" refers to the nominal design dimension of the widest part of the vehicle, exclusive of signal lamps, marker lamps, outside rearview mirrors, flexible fender extensions, and mud flaps, determine with doors and windows closed, and the wheels in the straight-ahead position.

This supersedes the interpretation of the term "overall width" appearing in the FEDERAL REGISTER of March 1, 1967 (32 F.R. 3390).

(2) Paragraph S3.1 and Tables I and III of § 571.108 as amended (32 F.R. 18033, Dec. 16, 1967), specify that certain lamp assemblies shall conform to applicable SAE Standards. Each of these basically referenced standards subreferences both SAE Standard J575 (tests for motor vehicle lighting devices and components) which in turn references SAE Standard J573 on bulbs, and SAE Standard J567 on bulb sockets.

(3) Paragraph C of SAE Standard J575 states in part: "Where special bulbs are specified, they should be submitted with the devices and the same or similar bulbs used in the tests and operated at their rated mean spherical candlepower." The Administrator has determined that this provision of SAE Standard J575 permits the use of special bulbs, including tubular-type bulbs, which do not conform to the detailed requirements of Table I of SAE Standard J573. It follows that the sockets for special bulbs need not conform to the detailed requirements of SAE Standard J567. These provisions for special bulbs in no way except the lamp assemblies from meeting all performance requirements specified in Federal Standard No. 108, including those specified in the basically referenced SAE Standards, and in the subreferenced SAE Standard J575.

[FR Doc. 76—24446 Filed 8-20-76; 8:45 am]

Effective: March 1, 1975

Motor Vehicle Safety Standard No. 119

New Pneumatic Tires for Vehicles Other Than Passenger Cars

S1. Scope. This standard establishes performance and marking requirements for tires for use on multipurpose passenger vehicles, trucks, buses, trailers, and motorcycles.

S2. Purpose. The purpose of this standard is to provide safe operational performance levels for tires used on motor vehicles other than passenger cars, and to place sufficient information on the tires to permit their proper selection and use.

S3. Application. [This standard applies to new pneumatic tires designed for highway use on multipurpose passenger vehicles, trucks, buses, trailers and motorcycles manufactured after 1948. (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

S4. Definitions. All terms defined in the Act and the rules and standards issued under its authority are used as defined therein.

["Light truck tire" means a tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles. (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

"Model rim assembly" means a test device that (a) includes a rim which conforms to the published dimensions of a commercially available rim, (b) includes an air valve assembly when used for testing tubeless tires or an innertube and flap (as required) when used for testing tube-type tires, and (c) undergoes no permanent rim deformation and allows no loss of air through the portion that it comprises of the tire-rim pressure chamber when a tire is properly mounted on the assembly and subjected to the requirements of the standard.

S5. Tire and rim matching information.

S5.1 [Each manufacturer of tires shall ensure that a listing of rims that may be used with each tire that he produces is provided to the public. For purposes of this section, each rim listing shall include dimensional specifications and a diagram of the rim. However, a listing compiled in accordance with paragraph (a) of this section need not include dimensional specifications or a diagram of a rim if the rim's dimensional specifications and diagram are contained in each listing published in accordance with paragraph (b). The listing shall be in one of the following forms:

(a) Listed by manufacturer name or brand name in a document furnished to dealers of the manufacturer's tires, to any person upon request, and in duplicate to: Tire Division, National Highway Traffic Safety Administration, 499 Seventh Street, S.W., Washington, D.C. 20590; or

(b) Contained in publications, current at the date of the manufacture of tire or any later date, of at least one of the following organizations:

The Tire and Rim Association.
The European Tyre and Rim Technical Organisation.
Japanese Industrial Standards.
Deutsche Industrie Norm.
The Society of Motor Manufacturers and Traders, Ltd.
British Standards Institution.
Scandinavian Tire and Rim Organisation.

(40 F.R. 5529—February 6, 1975. Effective: 3/1/75)]

S5.2. Information contained in a publication specified in S5.1(b) which lists general categories of tires and rims by size designation, type of construction, and/or intended use, shall be considered to be manufacturer's information pursuant to S5.1 for the listed tires, unless the publication itself or specific information provided according to S5.1(a) indicates otherwise.

S6. Requirements. [Each tire shall be capable of meeting any of the applicable requirements set forth below, when mounted on a model rim assembly corresponding to any rim designated by the tire manufacturer for use with the tire in accordance with S5. However, a particular tire need not meet further requirements after having been subjected to and met the endurance test (S6.1), strength test (S6.2), or high speed performance test (S6.3). (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

S6.1 Endurance.

S6.1.1 Prior to testing in accordance with the procedures of S7.2, a tire shall exhibit no visual evidence of tread, sidewall, ply, cord, innerliner, or bead separation, chunking, broken cords, cracking, or open splices.

S6.1.2 When tested in accordance with the procedures of S7.2:

(a) There shall be no visual evidence of tread, sidewall, ply, cord, innerliner, or bead separation, chunking, broken cords, cracking, or open splices.

(b) The tire pressure at the end of the test shall be not less than the initial pressure specified in S7.2(a).

S6.2 Strength. When tested in accordance with the procedures of S7.3 a tire's average breaking energy value shall be not less than the value specified in Table II for that tire's size and load range.

S6.3 High speed performance. [When tested in accordance with the procedures of S7.4, a tire shall meet the requirements set forth in S6.1.1 and S6.1.2(a) and (b). However, this requirement applies only to motorcycle tires and to non-speed-restricted tires of 14.5-in. nominal rim diameter or less marked load range A, B, C, or D. (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

S6.4 Treadware indicators. [Except as specified below, each tire shall have at least six treadwear indicators spaced approximately equally around the circumference of the tire that enable a person inspecting the tire to determine visually

TABLE I – STRENGTH TEST PLUNGER DIAMETER

Tire type:	Plunger Diameter (inches)
Light truck	3/4
Motorcycle	5/16
Tires for 12-inch or smaller rims, except motorcycle	3/4
Tires other than the above types:	
Tubeless:	
17.5-inch or smaller rims	3/4
Larger than 17.5-inch rims:	
Load range F or less	1 1/4
Load range over F	1 1/2
Tube type:	
Load range F or less	1 1/4
Load range over F	1 1/2

TABLE II – MINIMUM STATIC BREAKING ENERGY (INCH-POUNDS)

Plunger diameter	5/16 Inch	3/4 Inch		1 1/4 Inch		1 1/2 Inch	
Tire characteristic	Motorcycle	All 12-inch or smaller rim size	-Light truck -17.5 inch or smaller Rim Tubeless	Tube type	Tubeless	Tube type	Tubeless
Load range							
A	150	600	2000	----	----	----	----
B	300	1200	2600	----	----	----	----
C	400	1800	3200	6800	5100	----	----
D	---	2400	4550	7900	6500	----	----
E	---	3000	5100	12500	8600	----	----
F	---	3600	5700	15800	12500	----	----
G	---	----	6300	----	----	20200	15000
H	---	----	6800	----	----	23000	18500
J	---	----	----	----	----	25000	19500
L	---	----	----	----	----	27000	----
M	---	----	----	----	----	28500	----
N	---	----	----	----	----	30000	----

For rayon cord tires, applicable energy values are 60 percent of those in table.

TABLE III – ENDURANCE TEST SCHEDULE

Description	Load Range	Test Wheel Speed (rpm)	Test Load: Percent of maximum load rating			Total test revolutions (thousands)
			I 7 hrs.	II 16 hrs.	III 24 hrs.	
Speed-Restricted Service						
55 m.p.h.	All	125	66	84	101	352.5
50 m.p.h.	C, D	150	75	97	114	423.0
	E, F, G, H, J, L	100	66	84	101	282.0
35 m.p.h.	All	75	66	84	101	211.5
Motorcycle	All	250	[1]100	[2]108	117	510.0
All others	A, B, C, D	250	[1]75	[2]97	114	510.0
	E	200	70	88	106	564.0
	F	200	66	84	101	564.0
	G	175	66	84	101	493.5
	H, J, L, N	150	66	84	101	423.0

[1]4 hours for tire sizes subject to high speed requirements (S6.3)
[2]6 hours for tire sizes subject to high speed requirements (S6.3)

whether the tire has worn to a tread depth of one-sixteenth of an inch. Tires with 12-inch or smaller rim diameter shall have at least three such treadwear indicators. Motorcycle tires shall have at least three such indicators which permit visual determination that the tire has worn to a tread depth of one-thirty-second of an inch. (39 F.R. 12104—April 3, 1974. Effective: 3/1/75)]

S6.5 Tire marking. [Except as specified below, each tire shall be marked on each sidewall with the information specified in paragraphs (a) through (j) of this section. The markings shall be placed between the maximum section width (exclusive of sidewall decoration or curb ribs) and the bead on at least one sidewall. The marking shall be in letters and numerals not less than 0.078 inches high and raised above or sunk below the tire surface not less than 0.015 inches, except that the marking depth shall be not less than 0.010 inches in the case of motorcycle tires. The tire identification and the DOT symbol labeling shall comply with Part 574 of this chapter. Markings may appear on only one sidewall and the entire sidewall area may be used in the case of motorcycle tires and recreational, boat baggage, and special trailer tires. (39 F.R. 21201—April 3, 1974. Effective: 3/1/75)]

(a) The symbol DOT, which shall constitute a certification that the tire conforms to applicable Federal motor vehicle safety standards. This symbol may be marked on only one sidewall.

(b) The tire identification number required by Part 574 of this chapter. This number may be marked on only one sidewall.

(c) The tire size designation as listed in the documents and publications designated in S5.1.

[(d) The maximum load rating and corresponding inflation pressure of the tire, shown as follows:

(mark on tires rated for single and dual load)
Max load single ..... lbs at ..... psi cold
Max load dual ..... lbs at ..... psi cold
(Mark on tires rated only for single load)
Max load ..... lbs at ..... psi cold

(e) The speed restriction of the tire, if 55 mph or less, shown as follows:

Max speed ..... mph

(39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

(f) The actual number of plies and the composition of the ply cord material in the sidewall, and, if different, in the tread area.

(g) The words "tubeless" or "tube type" as applicable.

(h) The word "regroovable" if the tire is designed for regrooving.

(i) The word "radial" if a radial tire.

(j) The letter designating the tire load range.

S6.6 Maximum load rating. If the maximum load rating for a particular tire size is shown in one or more of the publications described in S5.1(b), each tire of that size designation shall have a maximum load rating that is not less than the published maximum load rating, or if there are differing published ratings for the same tire size designation, not less than the lowest published maximum load rating for the size designation.

S7. Test procedures.

S7.1 General conditions.

S7.1.1 The tests are performed using an appropriate new tube, tube valve and flap assembly (as required) that allows no loss of air for testing of tube-type tires under S7.2, S7.3, and S7.4, and tubeless tires under S7.3.

S7.1.2 The tire must be capable of meeting the requirements of S7.2 and S7.4 when conditioned at any ambient temperature up to 100° F. for 3 hours before the test is conducted, and with an ambient temperature maintained at any level up to 100° F. during all phases of testing. The tire must be capable of meeting the requirements of S7.3 when conditioned at any ambient temperature up to 70° F. for 3 hours before the test is conducted.

S7.2 Endurance. (a) Mount the tire on a model rim assembly and inflate it to the inflation pressure corresponding to the maximum load rating marked on the tire. Use single maximum load value when the tire is marked with both single and dual maximum load.

(b) After conditioning the tire-rim assembly in accordance with S7.1.2, adjust the tire pressure to that specified in (a) immediately before mounting the tire rim assembly.

(c) Mount the tire-rim assembly on an axle and press it against a flat-faced steel test wheel that is 67.23 inches in diameter and at least as wide as the tread of the tire.

(d) Apply the test load and rotate the test wheel as indicated in Table III for the type of tire tested conducting each successive phase of the test without interruption.

(e) Immediately after running the tire the required time, measure the tire inflation pressure. Remove the tire from the model rim assembly, and inspect the tire.

S7.3 Strength. (a) [Mount the tire on a model rim assembly and inflate it to the pressure corresponding to the maximum load, or maximum dual load where there is both a single and dual load marked on the tire. If the tire is tubeless, a tube may be inserted to prevent loss of air during the test in the event of puncture. (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

(b) After conditioning the tire-rim assembly in accordance with S7.1.2, adjust the tire pressure to that specified in (a).

(c) Force a cylindrical steel plunger, with a hemispherical end and of the diameter specified in Table I for the tire size, perpendicularly into a raised tread element as near as possible to the centerline of the tread, at a rate of 2 inches per minute, until the tire breaks or the plunger is stopped by the rim.

(d) Record the force and the distance of penetration just before the tire breaks, or if it fails to break, just before the plunger is stopped by the rim.

(e) [Repeat the plunger application at 72° intervals around the circumference of the tire, until five measurements are made. However, in the case of tires of 12-in. rim diameter or less, repeat the plunger application at 120° intervals around the circumference of the tire, until three measurements are made. (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

(f) Compute the breaking energy for each test point by the following formula:

$$W = \frac{FP}{2}$$

where

W = Breaking energy
F = Force in pounds, and
P = Penetration in inches.

(g) [Determine the average breaking energy value for the tire by computing the average of the values obtained in accordance with (f). (39 F.R. 5190—February 11, 1974. Effective: 3/1/75)]

S7.4 High speed performance.

(a) Perform steps (a) through (c) of S7.2.

(b) Apply a force of 88 percent of the maximum load rating marked on the tire (use single maximum load value when the tire is marked with both single and dual maximum loads), and rotate the test wheel at 250 rpm for 2 hours.

(c) Remove the load, allow the tire to cool to 100° F., and then adjust the pressure to that marked on the tire for single tire use.

(d) Reapply the same load, and without interruption or readjustment of inflation pressure, rotate the test wheel at 375 rpm for 30 minutes, then at 400 rpm for 30 minutes, and then at 425 rpm for 30 minutes.

(e) Immediately after running the tire the required time, measure the tire inflation pressure. Remove the tire from the model rim assembly, and inspect the tire.

38 F.R. 31299
November 13, 1973

Part 571.120 - Tire Selection and Rims for Vehicles Other Than Passenger Cars

RULES AND REGULATIONS

CHAPTER V—NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket No. 71-19; Notice 3]

PART 567—CERTIFICATION

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Tire Selection and Rims for Vehicles Other Than Passenger Cars

This notice establishes a new Federal Motor Vehicle Safety Standard No. 120, *Tire selection and rims for motor vehicles other than passenger cars*, 49 CFR 571.120, and amends 49 CFR Part 567, *Certification*. The new standard specifies tire and rim selection requirements for multipurpose passenger vehicles (MPV's), trucks, buses, trailers, and motorcycles, and marking requirements for rims for use on these vehicles. It also adds tire and rim matching information to the items required to appear on such vehicles' certification labels. The amendment to Part 567 makes that regulation consistent with the new standard. The notice is based on proposals which were published August 3, 1971 (36 FR 14273) and June 3, 1974 (39 FR 19505).

The standard requires new vehicles (other than passenger cars, which are the subject of Standard No. 110) to be equipped with tires that comply with either Standard No. 109, *New Pneumatic Tires—Passenger Cars*, or Standard No. 119, *New Pneumatic Tires for Vehicles Other Than Passenger Cars*. The tires must be fitted to rims which have been designated by the tire manufacturer, in accordance with S4.4 of Standard No. 109 or S5.1 of Standard No. 119, as suitable for use with those tires. The designations are made by listing the tire-rim matching information in one of seven industry-maintained publications or by furnishing this information to dealers of the manufacturer's tires, to any person upon request, and to the NHTSA.

Each axle must be equipped with tires the sum of whose load ratings is not less than that axle system's Gross Axle Weight Rating (GAWR). In certain situations, discussed below, a vehicle may be equipped with used tires of adequate load rating that were originally manufactured to comply with Standard No. 119. Adequacy is determined as follows: the sum of the maximum load ratings of the tires must be equal to or greater than the GAWR which is specified on the Part 567 certification label, with an exception discussed below. If the certification label lists more than one GAWR-tire combination for the axle, the sum of the tires' maximum load ratings must meet or exceed the GAWR that corresponds to the tires' size designation. If more than one combination is listed, but the size designation of the actual tires on the vehicle is not among those listed, then the sum of the load ratings must simply meet or exceed the lowest GAWR which does appear.

Rims must be marked with five items of information: the size designation (and, in the case of multipiece rims, the type designation), an indication of the source of the rim's nominal dimensions, and the DOT symbol must appear on the weather side, while identification of the manufacturer and date of manufacture may appear at any place on the rim's surface. The standard does not explicitly require that a rim conform to its published dimensions. If a rim's deviation from these nominal dimensions is so great that a safety hazard is presented, however, the defect notification and remedy provisions of the National Traffic and Motor Vehicle Safety Act of 1966, as amended, provide authority to deal with the hazard.

To reduce the possibility of confusion and to minimize the number of characters stamped on the rim, the standard establishes a set of code letters to indicate the source of the rim's nominal dimensions. "T", "E", "J", "D", "M", "B", and "S" indicate the industry publications listed in Standards Nos. 109 and 119 while "N" indicates an independent listing with tire dealers and the NHTSA. The proposed requirement that the marking indicate the date of the publication has not been adopted because it does not appear necessary. The standard does not require manufacturers to be identified with a code number assigned by the NHTSA, because no action has been taken on the proposal published in the FEDERAL REGISTER on June

7, 1973 (38 FR 14968). The rim manufacturer is free to use his name, trademark, or a symbol of his choice. Because a rim's maximum load rating may be limited by its disc, this standard does not require that the maximum load rating be marked. The rim's maximum inflation pressure, while not affected by the choice of disc, is potentially misleading without additional marking of the disc. These rim markings are being considered in conjunction with further NHTSA rulemaking activity concerning wheels.

Several commenters objected to the proposed requirement of a tire-rim information label, separate from and adjacent to the certification label required by Part 567. Upon consideration of these comments, the NHTSA agrees that a separate placard is unnecessary. GVWR and GAWR are already required to appear on the certification label. If the vehicle manufacturer exercises his option of listing more than one GVWR-GAWR combination, he is already required to indicate the proper tire size designations after each weight rating. Standard No. 120 further requires, for vehicles other than passenger cars, the following information to appear after each weight rating and tire size designation listed on the certification label: rim size designation, cold inflation pressure for the tires, and speed restriction if any for the tires. This information is now required to appear even when only one GVWR-GAWR combination is listed. The Part 567 label is thus expanded to include the information that would have appeared on the separate label described in S5.4 of the proposed Standard No. 123.

Many commenters pointed to the large number of possible axle-tire-rim combinations and suggested that the information label would be too large and confusing. Some discussed the vehicle manufacturer's difficulty in ensuring that the required information appear, given the common practice of changing tires and rims after a new vehicle has been shipped to a dealer. These commenters appear to have misunderstood the various proposed and existing requirements. Part 567 does not, in its prior form or as amended today, require a listing for more than one GVWR-GAWR-tire combination. Further, while S5.1.2 of Standard No. 120 requires the tires with which a new vehicle is equipped to be of adequate load rating for the GAWR, and while S5.3 requires an indication of tires adequate for the GAWR, there is no requirement that the actual tires be listed on the certification label. The tire information on that label is intended as a guide which tells the user what replacement tires, as a minimum, are appropriate for the listed GAWR and what rims are appropriate for those tires.

Guerdon Industries, Inc. objected to the requirement that vehicles be restricted to the load limits molded on tire sidewalls. They pointed to the mobile home industry's practice of loading tires to 150 percent of their load ratings, and argued that this practice should be permitted to continue. Examination of data compiled by the Bureau of Motor Carrier Safety, however, shows that from 1959 to 1972 (the most recent years for which figures are available), tires accounted for 18.0 percent of reported mobile home accidents. The NHTSA therefore rejects the proposition that such overloading does not present a safety hazard. There is no exception to the requirement that all vehicles be equipped with tires of adequate load rating.

Some commenters requested that tire overloading be permitted under restricted speed conditions. These commenters appear to have misunderstood the scope of the standard. Vehicles-in-use are regulated by the States and by the Bureau of Motor Carrier Safety. Standard No. 120 does not prohibit the overloading of tires in speed-restricted service, or otherwise regulate the use of tires or vehicles. The GVWR and GAWR information on the certification label is based on unrestricted service.

The formula described above for tire selection is subject to an exception for MPV's, trucks, buses, and trailers which are equipped with passenger car tires. The combined maximum load rating of the passenger car tires on an axle must be equal to or greater than 110 percent of the axle's GAWR. Some comments supported this exception as it was proposed. Others suggested that passenger car tires be permitted on such vehicles without the 110% factor, while the RMA and others argued that passenger car tires should not be permitted on trailers at all. The NHTSA rejects the argument that the 110% correction factor is unnecessary. Because non-passenger-car service on the average puts greater stresses on a tire (for example, trucks and trailers are driven at or near their maximum rated loads more often than passenger cars), a given load rating for a Standard No. 109 tire does not have the same meaning as the identical load rating for a Standard No. 119 tire. Conversely, the NHTSA has found no evidence that passenger car tires are inadequate for

trailer service when the load correction factor is applied. The 110 percent factor is therefore adopted as proposed.

As proposed, the standard included an exception to the requirement that new vehicles be equipped with new tires conforming to Standard No. 109 or 119. Used tires were to be permitted on a truck, bus, or trailer (other than a mobile structure trailer) under the following conditions: the tires were originally manufactured to comply with Standard No. 119; they were of adequate load rating; they were owned or leased by the purchaser; and they were installed on the new vehicle at its place of manufacture at the purchaser's request. Comments on this exception were generally favorable, although one mobile home manufacturer objected to the exclusion of mobile structure trailers. The exception was intended to accommodate commerciai delivery practices in the truck, bus, and trailer industry. While fleets which lease tires on a mileage-contract basis or which install their own used tires on new vehicles are in a good position to know the condition of these tires, the mobile home purchaser has no knowledge of the history of used tires installed on his vehicle. The proposed exception to the new tire requirement is therefore not extended to include all mobile structure trailers. It is, however, extended to include those delivered to the purchaser by a motor carrier, because a motor carrier (who is subject to Bureau of Motor Carrier Safety regulations) can be expected to be more familiar with tire safety needs than a typical purchaser. To clarify the proposed language "originally manufactured to comply with Standard No. 119", the words "as evidenced by the DOT symbol" have been added to the text of the standard

Several commenters pointed out that certain vehicles are designed for non-uniform side to side loading, and suggested that the proposed method of determining the necessary tire load rating from the GAWR (dividing GAWR by the number of wheel positions on the axle) is inadequate for such vehicles. These commenters argued that tire load rating should be based on the maximum wheel load, rather than on the GAWR. The standard issued today does not specify the maximum load rating to be exceeded by each tire on any given axle. Instead, it requires the sum of those load ratings to meet or exceed the GAWR. The manufacturer of an asymmetrically designed vehicle can therefore equip an axle with tires of different load ratings. The NHTSA agrees that each tire should be capable of carrying its maximum expected wheel load. At this time, however, the NHTSA considers its defect authority, combined with the new standard, adequate to ensure that vehicles are equipped with such tires.

Definitions have been added to clarify the meaning of "rim base", "rim size designation", "rim type designation", "rim diameter", "rim width", and "weather side." Definitions suggested for other terms have not been included in the standard because the meanings have been found to be widely understood or self evident.

Many comments pointed out problems with a single effective date. For example, for marked rims to be available to vehicle manufacturers in time, an interval is necessary between the effective dates for the rim marking requirement and the requirement that vehicles be equipped with rims that comply with the standard. Similarly, to require all used tires, otherwise permitted by S5.1.3 to have originally been manufactured to comply with Standard No. 119 would, without a delayed effective date, cause the waste of pre-Standard No. 119 tires of adequate load-carrying capacity. Accordingly, a staggered system of effective dates is established as set out below.

In consideration of the foregoing, Chapter V of Title 49, Code of Federal Regulations, is amended as follows:

1. In Part 567, §567.4(h) is amended to read:

§ 567.4 Requirements for manufacturers of motor vehicles.

. . . . . .

(h)(1) (For passenger cars only) In cases where different tire sizes are offered as a customer option, a manufacturer may at his option list more than one set of values for GVWR and GAWR, in response to the requirements of paragraphs (g)(3) and (4) of this section. If the label shows more than one set of weight rating values, each value shall be followed by the phrase "with ..... tires," inserting the proper tire size designations. A manufacturer may at his option list one or more tire sizes where only one set of weight ratings is provided.

Passenger Car Example

GVWR:

4400 LB with G78-14B Tires,
4800 LB with H78-14B Tires.

GAWR:

Front—2000 LB with G78-14B Tires at 24 psi, 2200 LB with H78-14B Tires at 24 psi.

Rear—2400 LB with G78-14B Tires at 28 psi, 2600 LB with H78-14B Tires at 28 psi.

(2) (For multipurpose passenger vehicles, trucks, buses,

trailers, and motorcycles) The manufacturer may, at his option, list more than one GVWR-GAWR-tire-rim combination on the label. A nonpassenger-car example is set forth in Standard No. 120, *Tire selection and rims for motor vehicles other than passenger cars* (§571.120 of this chapter).

2. In Part 571, a new Standard No. 120, *Tire selection and rims for motor vehicles other than passenger cars* (§571.120) is added, to read as set forth below.

§ 571.120 Standard No. 120: tire selection and rims for motor vehicles other than passenger cars.

S1. *Scope.* This standard specifies tire and rim selection requirements and rim marking requirements.

S2. *Purpose.* The purpose of this standard is to provide safe operational performance by ensuring that vehicles to which it applies are equipped with tires of adequate size and load rating and with rims of appropriate size and type designation.

S3. *Application.* This standard applies to multipurpose passenger vehicles, trucks, buses, trailers, and motorcycles, and to rims for use on those vehicles.

S4. *Definitions.* All terms defined in the Act and the rules and standards issued under its authority are used as defined therein.

"Motor carrier" is used as defined in §390.15 of this title.

"Rim base" means the portion of a rim remaining after removal of all split or continuous rim flanges, side rings, and locking rings that can be detached from the rim.

"Rim size designation" means rim diameter and width.

"Rim diameter" means nominal diameter of the bead seat.

"Rim width" means nominal distance between rim flanges.

"Rim type designation" means the industry or manufacturer's designation for a rim by style or code.

"Weather side" means the surface area of the rim not covered by the inflated tire.

S5. *Requirements.*

S5.1 *Tire and rim selection.*

S5.1.1 Except as specified in S5.1.3, each vehicle equipped with pneumatic tires for highway service shall be equipped with tires that meet the requirements of Standard No. 109 (§571.109) or Standard No. 119 (§571.119), and with rims that are listed by the manufacturer of the tires as suitable for use with those tires, in accordance with S4.4 of Standard No. 109 or S5.1 of Standard No. 119, as applicable. On and after March 1, 1977, each such vehicle shall be equipped with rims that meet the requirements of this standard.

S5.1.2 The sum of the maximum load ratings of the tires fitted to an axle shall be not less than the gross axle weight rating (GAWR) of the axle system as specified on the vehicle's certification label required by 49 CFR Part 567. If the certification label shows more than one GAWR for the axle system, the sum shall be not less than the GAWR corresponding to the size designation of the tires fitted to the axle. If the size designation of the tires fitted to the axle does not appear on the certification label, the sum shall be not less than the lowest GAWR appearing on the label. When a tire listed in Appendix A of Standard No. 109 is installed on a multipurpose passenger vehicle, truck, bus, or trailer, the tire's load rating shall be reduced by dividing by 1.10 before calculating the sum.

S5.1.3 In place of tires that meet the requirements of Standard No. 119 a truck, bus, or trailer, other than a mobile structure trailer not delivered by a motor carrier, may at the request of the purchaser be equipped at the place of manufacture of the vehicle with used tires owned or leased by the purchaser or, in the case of a mobile structure trailer, by a delivering motor carrier), if the sum of the maximum load ratings meets the requirements of S5.1.2. On and after January 1, 1978, used tires employed under this provision must be originally manufactured to comply with Standard No. 119, as evidenced by the DOT symbol.

S5.2 *Rim marking.* On and after August 1, 1976, each rim shall be marked with the information listed in paragraphs (a) through (e) of this paragraph, in lettering not less than one-eighth inch high, impressed to a depth of not less than 0.005 inch below the surrounding surface. The information listed in paragraphs (a) through (c) of this paragraph shall appear on the weather side. In the case of rims of multipiece construction, the information listed in paragraphs (a) through (e) of this paragraph shall appear on the rim base and the information listed in paragraphs (b) and (d) of this paragraph shall also appear on each other part of the rim.

(a) A designation which indicates the source of the rim's published nominal dimensions, as follows:

(1) "T" indicates The Tire and Rim Association.

(2) "E" indicates The European Tyre and Rim Technical Organisation.

(3) "J" indicates Japanese Industrial Standards.

(4) "D" indicates Deutsche Industrie Norm.

(5) "M" indicates The Society of Motor Manufacturers & Traders, Ltd.

(6) "B" indicates British Standards Institution.

(7) "S" indicates Scandinavian Tire and Rim Organization.

(8) "N" indicates an independent listing pursuant to S4.4.1(a) of Standard No. 109 or S5.1(a) of Standard No. 119.

(b) The rim size designation, and, in case of multipiece rims, the rim type designation.

(c) The symbol DOT, constituting a certification by the manufacturer of the rim that the rim complies with all applicable motor vehicle safety standards.

(d) A designation that identifies the manufacturer of the rim by name, trademark, or symbol.

(e) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example,

"September 4, 1976" may be expressed as:

$$90476, \frac{904}{76}, \text{ or } \frac{76}{904}.$$

"September 1976" may be expressed as:

$$976, \frac{9}{76}, \text{ or } \frac{76}{9}.$$

S5.3 *Certification label.* The following information shall appear after each Gross Vehicle Weight Rating (GVWR) and each Gross Axle Weight Rating (GAWR) listed on the certification label required by § 567.4 or § 567.5 of this chapter.

(a)(1) After GVWR, the size designation of tires (not necessarily those on the vehicle) appropriate as a minimum for the GAWR's corresponding to that GVWR.

(2) After GAWR, the size designation of tires (not necessarily those on the vehicle) appropriate as a minimum for the GAWR.

(b) The size designation and, if applicable, the type designation of rims (not necessarily those on the vehicle) appropriate for those tires.

(c) Cold inflation pressure for those tires.

(d) Speed restriction, if any, for those tires.

Truck example

GVWR:

17,280 with 7.50-20(D) tires, 20 x 6.00 rims, at 75 psi cold single, 65 psi cold dual, (max. speed...).

17,340 with 7.00-20(E) tires, 20 x 5.50 rims, at 90 psi cold single, 80 psi cold dual, (max. speed ...).

GAWR:

Front—6,280 with 7.50-20(D) tires, 20 x 6.00 rims, at 75 psi cold single (max. speed ...).—6.300 with 7.00-20(E) tires, 20 x 5.50 rims, at 90 psi cold single. (max. speed ...).

Rear—11.000 with 7.50-20(D) tires, 20 x 6.00 rims, at 65 psi cold dual. (max. speed ...).—11.040 with 7.00-20(E) tires, 20 x 5.50 rims, at 80 psi cold dual, (max. speed ...).

Effective dates. For the amendment to Part 567: September 1, 1976. For Standard No. 120: August 1, 1976, for the rim marking requirements (S5.2), and September 1, 1976, for the remaining requirements, except as otherwise provided in the standard.

(Secs. 103, 112, 114, 119, 201, 202, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401; 1403, 1407, 1421, 1422); delegation of authority at 49 CFR 1.50.)

Issued on January 19, 1976.

JAMES B. GREGORY,
Administrator.

[FR Doc. 76-2067 Filed 1-22-76; 8:45 am]

Motor Vehicle Safety Standard No. 122

Motorcycle Brake Systems

S1. Scope. This standard specifies performance requirements for motorcycle brake systems.

S2. Purpose. The purpose of the standard is to insure safe motorcycle braking performance under normal and emergency conditions.

S3. Application. This standard applies to motorcycles.

S4. Definitions.

"Braking interval" means the distance measured from the start of one brake application to the start of the next brake application.

"Initial brake temperature" means the temperature of the hottest service brake of the vehicle 0.2 mile before any brake application.

"Skid number" means the frictional resistance of a pavement measured in accordance with American Society for Testing and Materials Method E-274-65T at 40 mph omitting water delivery as specified in paragraph 7.1 of that method.

"Speed attainable in 1 mile" means the speed attainable by accelerating at maximum rate from a standing start for 1 mile, on a level surface.

"Stopping distance" means the distance traveled by a vehicle from the start of the brake application to the point where the vehicle stops.

"Split service brake system" means a brake system consisting of two or more subsystems actuated by a single control designed so that a leakage-type failure of a pressure component in a single subsystem (except structural failure of a housing that is common to all subsystems) shall not impair the operation of the other subsystem(s).

S5. Requirements. Each motorcycle shall meet the following requirements under the conditions specified in S6, when tested according to the procedures and in the sequence specified in S7. Corresponding test procedures of S7 are

TABLE I
STOPPING DISTANCES FOR EFFECTIVENESS, FADE AND PARTIAL SYSTEM TESTS

Vehicle test speed m.p.h.	Stopping distance, feet			
	Effectiveness tests			
	Preburnish effectiveness total system (S5.2.1)	Preburnish effectiveness partial mechanical systems (S5.2.2)	Effectiveness total system (S5.4) (S5.7.1)	Effectiveness partial hydraulic systems (S5.7.2)
	I	II	III	IV
15	13	30	11	25
20	24	54	19	44
25	37	84	30	68
30	54	121	43	97
35	74	165	58	132
40	96	216	75	173
45	121	273	95	218
50	150	337	128	264
55	181	407	155	326
60	216	484	185	388
65	.....	.....	217	415
70	.....	.....	264	527
75	.....	.....	303	606
80	.....	.....	345	689
85	.....	.....	389	788
90	.....	.....	484	872
95	.....	.....	540	971
100	.....	.....	598	1076
105	.....	.....	659	1188
110	.....	.....	723	1302
115	.....	.....	791	1423
120	.....	.....	861	1549

[(39 F.R. 32914 — September 12, 1974. Effective: 10/14/74)]

TABLE II
BRAKE TEST SEQUENCE AND REQUIREMENTS

SEQUENCE L.C.	Test procedure	Requirements
1. Instrumentation check .	S7.2	
2. First (Preburnish) effectiveness test:		
(a) Service brake system	S7.3.1	S5.2.1
(b) Partial service brake system	S7.3.2	S5.2.2
3. Burnish procedure.....	S7.4	
4. Second effectiveness test	S7.5	S5.3
5. First fade and recovery test	S7.6	S5.4
6. Reburnish	S7.7	
7. Final effectiveness test:		
(a) Service brake system	S7.8.1	S5.6.1
(b) Partial service brake system	S7.8.2	S5.5.2
8. Parking brake test (three-wheeled motorcycles only).....	S7.9	S5.6
9. Water recovery test....	S7.10	S5.8
10. Design durability.....	S7.11	S5.8

indicated in parentheses. If a motorcycle is incapable of attaining a specified speed, its service brakes shall be capable of stopping the vehicle from the multiple of 5 mph that is 4 mph to 8 mph less than the speed attainable in 1 mile, within stopping distances that do not exceed the stopping distances specified in Table 1.

S5.1 Required equipment – split service brake system. Each motorcycle shall have either a split service brake system or two independently actuated service brake systems.

S5.1.1 Mechanical service brake system. Failure of any component in a mechanical service brake system shall not result in a loss of braking ability in the other service brake system on the vehicle.

S5.1.2 Hydraulic service brake system. A leakage failure in a hydraulic service brake system shall not result in a loss of braking ability in the other service brake system on the vehicle. Each motorcycle equipped with a hydraulic brake system shall have the equipment specified in S5.1.2.1 and S5.1.2.2.

S5.1.2.1 Master cylinder reservoirs. Each master cylinder shall have a separate reservoir for each brake circuit, with each reservoir filler opening having its own cover, seal, and cover retention device. Each reservoir shall have a minimum capacity equivalent to one and one-half times the total fluid displacement resulting when all the wheel cylinders or caliper pistons serviced by the reservoir move from a new lining, fully retracted position to a fully worn, fully applied position. Where adjustment is a factor, the worst condition of adjustment shall be used for this measurement.

S5.1.2.2 [Reservoir labeling. Each motorcycle shall have a brake fluid warning statement that reads as follows, in letters at least $\frac{1}{8}$" of an inch high:

"WARNING: Clean filler cap before removing. Use only _____ fluid from a sealed container." (Inserting the recommended type of brake fluid as specified in 49 CFR §571.116, e.g. DOT 3)

The lettering shall be –

(a) Permanently affixed, engraved or embossed;

(b) Located so as to be visible by direct view, either on or within 4 inches of the brake fluid reservoir filler plug or cap; and

(c) Of a color that contrasts with its background, if it is not engraved or embossed. S8 F.R. 04753 - June 5, 1973. Effective: 1/1/74)]

S5.1.3 Split service brake system. In addition to the equipment required by S5.1.2 each motorcycle equipped with a split service brake system shall have a failure indicator lamp as specified in S5.1.3.1.

S5.1.3.1. Failure indicator lamp.

(a) One or more electrically operated service brake system failure indicator lamps that is mounted in front of and in clear view of the driver, and that is activated–

(1) In the event of pressure failure in any part of the service brake system, other than a structural failure of either a brake master cylinder body in a split integral body type master cylinder system or a service brake system failure indicator body, before or upon application of not more than 20 pounds of pedal force upon the service brake.

(2) Without the application of pedal force, when the level of brake fluid in a master cylinder reservoir drops to less than the recommended safe level specified by the manufacturer or to less than one-half the fluid reservoir capacity, whichever is the greater.

(b) All failure indicator lamps shall be activated when the ignition switch is turned from the "off" to the "on" or to the "start" position.

(c) Except for the momentary activation required by S5.1.3.1(b), each indicator lamp, once activated, shall remain activated as long as the condition exists, whenever the ignition switch is in the "on" position. An indicator lamp activated when the ignition is turned to the "start" position shall be deactivated upon return of the switch to the "on" position unless a failure exists in the service brake system.

(d) Each indicator lamp shall have a red lens with the legend "Brake Failure" on or adjacent to it in letters not less than $\frac{5}{32}$ of an inch high that shall be legible to the driver in daylight when lighted.

S5.1.4 Parking Brake. Each three-wheeled motorcycle shall be equipped with a parking brake of a friction type with a solely mechanical means to retain engagement.

S5.1.5 Other requirements. The brake system shall be installed so that the lining thickness of drum brake shoes may be visually inspected, either directly or by use of a mirror without removing the drums, and so that disc brake friction lining thickness may be visually inspected without removing the pads.

S5.2 Service Brake System. First (preburnish) effectiveness.

S5.2.1 Service brake system. The service brakes shall be capable of stopping the motorcycle from 30 mph and 60 mph within stopping distances which do not exceed the stopping distances specified in Column I of Table I (S7.3.1).

S5.2.2 Partial service brake system. Each independently actuated service brake system on each motorcycle shall be capable of stopping the motorcycle from 30 mph and 60 mph within stopping distances which do not exceed the stopping distances specified in Column II of Table I (S7.3.2).

S5.3 Service brake system — second effectiveness. The service brakes shall be capable of stopping the motorcycle from 30 mph, 60 mph, 80 mph, and the multiple of 5 mph that is 4 mph to 8 mph less than the speed attainable in 1 mile if this speed is 95 mph or greater, within stopping distances that do not exceed the stopping distances specified in Column III of Table I (S7.5).

S5.4 Service brake system — fade and recovery. [These requirements do not apply to a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less. (39 F.R. 32914 — September 12, 1974. Effective: 10/14/74)]

S5.4.1 Baseline check — minimum and maximum pedal forces. The pedal and lever forces used in establishing the fade baseline check average shall be within the limits specified in S6.10 (S7.6.1).

S5.4.2. Fade. Each motorcycle shall be capable of making 10 fade stops from 60 mph at not less than 15 fpsps for each stop (S7.6.2).

S5.4.3 Fade recovery. Each motorcycle shall be capable of making five recovery stops with a pedal force that does not exceed 90 pounds, and a hand lever force that does not exceed 55 pounds for any of the first four recovery stops and that for the fifth recovery stop is within plus 20 pounds and minus 10 pounds of the fade test baseline check average force (S7.6.3).

S5.5 Service brake system — final effectiveness. [These requirements do not apply to a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less. (39 F.R. 32914 — September 12, 1974. Effective: 10/14/74)]

S5.5.1 Service brake system. The service brakes shall be capable of stopping the motorcycle in a manner that complies with S5.3 (S7.8.1).

S5.5.2 Hydraulic service brake system — partial failure. In the event of a pressure component leakage failure, other than a structural failure of either a brake master cylinder body in a split integral body type master cylinder system or a service brake system failure indicator body, the remaining portion of the service brake system shall continue to operate and shall be capable of stopping the motorcycle from 30 mph and 60 mph within stopping distances that do not exceed the stopping distances specified in Column IV of Table I (S7.8.2).

S5.6 Parking brake system. The parking brake system shall be capable of holding the motorcycle, for 5 minutes, in both forward and reverse directions, on a 30 percent grade, with an applied force of not more than 90 pounds for a foot-operated system, and 55 pounds for hand-operated system (S7.9).

S5.7 Service brake system — water recovery.

S5.7.1 Baseline check. The pedal and lever forces used in establishing the water recovery baseline check average shall be within the limits specified in S6.10 (S7.10.1).

S5.7.2 Water recovery test. Each motorcycle shall be capable of making five recovery stops with a pedal force that does not exceed 90 pounds, and a hand lever force that does not exceed 55 pounds, for any of the first four recovery stops,

and that for the fifth recovery stop, is within plus 20 pounds and minus 10 pounds of the baseline check average force (S7.10.2).

S5.8 Service brake system design durability. Each motorcycle shall be capable of completing all braking requirements of S5 without detachment of brake linings from the shoes or pad, detachment or fracture of any brake system components, or leakage of fluid or lubricant at the wheel cylinder, and master cylinder reservoir cover, seal, or retention device (S7.11).

S6 Test conditions. The requirements of S5 shall be met under the following conditions. Where a range of conditions is specified, the motorcycle shall be capable of meeting the requirements at all points within the range.

S6.1 Vehicle weight. Motorcycle weight is unloaded vehicle weight plus 200 pounds (including driver and instrumentation), with the added weight distributed in the saddle or carrier if so equipped.

S6.2 Tire inflation pressure. Tire inflation pressure is the pressure recommended by the manufacturer for the vehicle weight specified in paragraph S6.1.

S6.3 Transmission. Unless otherwise specified, all stops are made with the clutch disengaged.

S6.4 Engine. Engine idle speed and ignition timing settings are according to the manufacturer's recommendations. If the vehicle is equipped with an adjustable engine speed governor, it is adjusted according to the manufacturer's recommendation.

S6.5 Ambient temperature. The ambient temperature is between 32° and 100° F.

S6.6 Wind velocity. The wind velocity is zero.

S6.7 Road surface. Road tests are conducted on level roadway having a skid number of 75. The roadway is 8 feet wide for two-wheeled motorcycles, and overall vehicle width plus 5 feet for three-wheeled motorcycles.

S6.8 Vehicle position. The motorcycle is aligned in the center of the roadway at the start of each brake application. Stops are made without any part of the motorcycle leaving the roadway and without lockup of any wheel.

S6.9 Thermocouples. The brake temperature is measured by plug-type thermocouples installed in the approximate center of the facing length and width of the most heavily loaded shoe or disc pad, one per brake, as shown in Figure 1.

S6.10 Brake actuation forces. Except for the requirements of the fifth recovery stop in S5.4.3 and S5.7.2 (S7.6.3 and S7.10.2) the hand lever

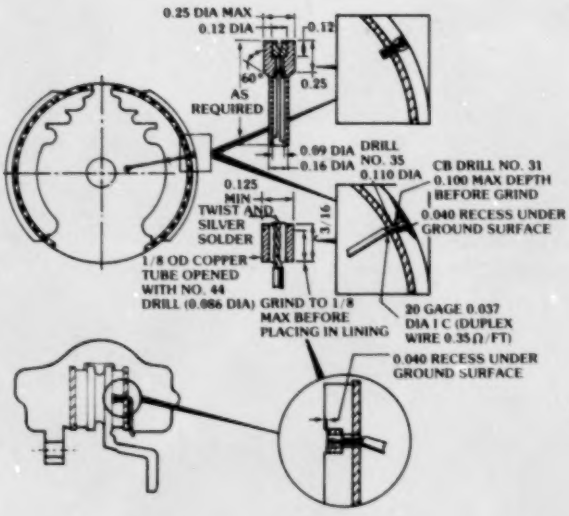
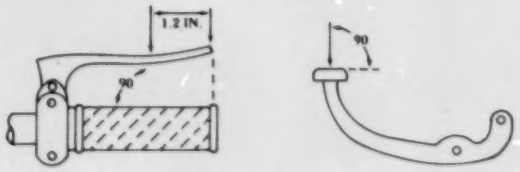


FIGURE 1
TYPICAL PLUG TYPE THERMOCOUPLE INSTALLATIONS

force is not less than five and not more than 55 pounds and the foot pedal force is not less than 10 and not more than 90 pounds. The point of initial application of the lever forces is 1.2 inches from the end of the brake lever grip. The direction of the force is perpendicular to the handle grip on the plane along which the brake lever rotates, and the point of application of the pedal force is the center of the foot contact pad of the brake pedal. The direction of the force is perpendicular to the foot contact pad on the plane along which the brake pedal rotates, as shown in Figure 2.

FIGURE 2 DIRECTION OF FORCE



(BRAKE LEVER) (BRAKE PEDAL)

S7. Test procedures and sequence. Each motorcycle shall be capable of meeting all the requirements of this standard when tested according to the procedures and in the sequence set forth below without replacing any brake system part, or making any adjustments to the brake system other than as permitted in S7.4. A motorcycle shall be deemed to comply with S5.2, S5.3 and S5.5 if at least one of the stops specified in S7.3, S7.5 and S7.8 is made within the stopping distances specified in Table I.

S7.1 Brake warming. If the initial brake temperature for the first stop in a test procedure (other than S7.10) has not been reached, heat the brakes to the initial brake temperature by making up to 10 stops from 30 mph at a deceleration of not more than 10 fpsps. On independently operated brake systems, the coldest brake shall be within 10° F. of the hottest brake.

S7.2 Pretest instrumentation check. Conduct a general check of test instrumentation by making not more than 10 stops from a speed of not more than 30 mph at a deceleration of not more than 10 fpsps. If test instrument repair, replacement, or adjustment is necessary, make not more than 10 additional stops after such repair, replacement or adjustment.

S7.3 Service brake system — first (preburnished) effectiveness test.

S7.3.1 Service brake system. Make six stops from 30 mph and then six stops from 60 mph with an initial brake temperature between 130° F. and 150° F.

S7.3.2 Partial service brake system. For a motorcycle with two independently actuated service brake systems, repeat S7.3.1 using each service brake system individually.

S7.4 Service brake system — burnish procedure. Burnish the brakes by making 200 stops from 30 mph at 12 fpsps. The braking interval shall be either the distance necessary to reduce the initial brake temperature to between 130° F. and 150° F. or 1 mile, whichever occurs first. Accelerate at maximum rate to 30 mph immediately after each stop and maintain that speed until making the next stop. After burnishing adjust the brakes in accordance with the manufacturer's recommendation.

S7.5 Service brake system — second effectiveness test. Repeat S7.3.1. Then, make four stops from 80 mph and four stops from the multiple of 5 mph that is 4 mph to 8 mph less than the speed attainable in 1 mile if that speed is 95 mph or greater.

S7.6 Service brake system — fade and recovery test. [These requirements do not apply to a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less. (39 F.R. 32914 — September 12, 1974. Effective: 10/14/74)]

S7.6.1 Baseline check stops. Make three stops from 30 mph at 10 to 11 fpsps for each stop. Compute the average of the maximum brake pedal forces and the maximum brake lever forces required for the three stops.

S7.6.2 Fade stops. Make 10 stops from 60 mph at not less than 15 fpsps for each stop. The initial brake temperature before the first brake application shall be between 130° F. and 150° F. Initial brake temperatures before brake applications for subsequent stops shall be those occurring at the distance intervals. Attain the required deceleration as quickly as possible and maintain at least this rate for not less than three-fourths of the total stopping distance for each stop. The interval between the starts of service brake applications shall be 0.4 mile. Drive 1 mile at 30 mph after the last fade stop and immediately conduct the recovery test specified in S7.6.3.

S7.6.3 Recovery test. Make five stops from 30 mph at 10 to 11 fpsps for each stop. The braking interval shall not be more than 1 mile. Immediately after each stop accelerate at maximum rate to 30 mph and maintain that speed until making the next stop.

S7.7 Service brake system — reburnish. [Repeat S7.4 except make 35 burnish stops instead of 200 stops. Brakes may be adjusted after reburnish if no tools are used. These requirements do not apply to a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less. (39 F.R. 32914 — September 12, 1974. Effective: 10/14/74)]

S7.8 Service brake system — final effectiveness test. [These requirements do not apply to a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less. (39 F.R. 32914 September 12, 1974. Effective: 10/14/74)]

S7.8.1 Service brake system. Repeat S7.6 including S7.3.1.

S7.8.2 Partial service brake system test. Alter the service brake system on three-wheeled motorcycles to induce a complete loss of braking in any one subsystem. Determine the line pressure or pedal force necessary to cause the brake system failure indicator to operate. Make six stops from 30 mph and then six stops from 60 mph with an initial brake temperature between 130° F. and 150° F. Repeat for each subsystem. Determine that the brake failure indicator is

operating when the master cylinder fluid level is less than the level specified in S5.1.3.1(a)(2), and that it complies with S5.1.3.1(c). Check for proper operation with each reservoir in turn at a low level. Restore the service brake system to normal at completion of this test.

S7.9 Parking brake test. Starting with an initial brake temperature of not more than 150° F., drive the motorcycle downhill on the 30 percent grade with the longitudinal axis of the motorcycle in the direction of the grade. Apply the service brakes with a force not exceeding 90 pounds to stop the motorcycle and place the transmission in neutral. Apply the parking brake by exerting a force not exceeding those specified in S5.6. Release the service brake and allow the motorcycle to remain at rest for 5 minutes. Repeat the test with the motorcycle parked in the reversed (uphill) position on the grade.

S7.10 Service brake system—water recovery test.

S7.10.1 Baseline check stops. Make three stops from 30 mph at 10 to 11 fpsps for each stop. Compute the average of the maximum brake pedal forces and of the maximum brake lever forces required for the three stops.

S7.10.2 Wet brake recovery stops. [Completely immerse the rear brake assembly of the motorcycle in water for two minutes with the brake fully released. Next completely immerse the front brake assembly of the motorcycle in water for two minutes with the brake fully released. Perform the entire wetting procedure in not more than seven minutes. Immediately after removal of the front brake from water, accelerate at a maximum rate to 30 mph without a brake application. Immediately upon reaching that speed make five stops, each from 30 mph at 10 to 11 fpsps for each stop. After each stop (except the last) accelerate the motorcycle immediately at a maximum rate to 30 mph and begin the next stop. (38 F.R. 14753 — June 5, 1973. Effective: 1/1/74)]

S7.11 Final inspection. Upon completion of all the tests inspect the brake system in an assembled condition, for compliance with the brake lining inspection requirements. Disassemble all brakes and inspect:

(a) The entire brake system for detachment or fracture of any component.

(b) Brake linings for detachment from the shoe or pad.

(c) Wheel cylinder, master cylinder, and axle seals for fluid or lubricant leakage.

(d) Master cylinder for reservoir capacity and retention device.

(e) Master cylinder label for compliance with S5.1.2.2.

37 F.R. 5033
March 9, 1972

Effective: September 1, 1974

Motor Vehicle Safety Standard No. 123

Motorcycle Controls and Displays
(Docket No. 70–26; Notice 3)

S1. Scope. This standard specifies requirements for the location, operation, identification, and illumination of motorcycle controls and displays, and requirements for motorcycle stands and footrests.

S2. Purpose. The purpose of this standard is to minimize accidents caused by operator error in responding to the motoring environment, by standardizing certain motorcycle controls and displays.

S3. Application. This standard applies to motorcycles equipped with handlebars, except for motorcycles that are designed, and sold exclusively, for use by law enforcement agencies.

S4. Definitions. "Clockwise" and "counterclockwise" mean opposing directions of rotation around the following axes, as applicable:

(a) The operational axis of the ignition control, viewed from in front of the ignition lock opening;

(b) The axis of the right handlebar on which the twist-grip throttle is located, viewed from the end of that handlebar;

(c) The axis perpendicular to the center of the speedometer, viewed from the operator's normal eye position.

S5. Requirements.

S5.1 Each motorcycle shall be equipped with a supplemental engine stop control, located and operable as specified in Table I.

S5.2 Each motorcycle to which this standard applies shall meet the following requirements:

S5.2.1 Control location and operation. If any item of equipment listed in Table 1, Column 1, is provided, the control for such item shall be located as specified in Column 2, and operable as specified in Column 3. Each control located on a right handlebar shall be operable by the operator's right hand throughout its full range without removal of the operator's right hand from the throttle. Each control located on a left handlebar shall be operable by the operator's left hand throughout its full range without removal of the operator's left hand from the handgrip. If a motorcycle with an automatic clutch is equipped with a supplemental rear brake control, the control shall be located on the left handlebar. If a motorcycle is equipped with self-proportioning or anti-lock braking devices utilizing a single control for front and rear brakes, the control shall be located and operable in the same manner as a rear brake control.

S5.2.2 Display illumination and operation. If an item of equipment listed in Table 2, Column 1, is provided, the display for such item shall be visible to a seated operator under daylight conditions, shall illuminate as specified in Column 2, and shall operate as specified in Column 3.

S5.2.3 Control and display identification. If an item of equipment listed in Table 3, Column 1, is provided, the control for such item shall be identified by the word or words shown in Column 2 and any corresponding word in Column 3, placed on or adjacent to the control.

Control positions shall be identified as specified in Column 3, to signify the function performed at that setting. The abbreviations used in Columns 2 and 3 are minimum requirements and appropriate words may be spelled in full. Identification shall appear to the operator in an upright position.

Functional identification need not be provided for equipment items with no entry in Column 3.

S5.2.4 Stands. A stand shall fold rearward and upward if it contacts the ground when the motorcycle is moving forward.

S5.2.5 Footrests. Footrests shall be provided for each designated seating position. Each footrest for a passenger other than an operator shall fold rearward and upward when not in use.

TABLE 1
MOTORCYCLE CONTROL LOCATION AND OPERATIONAL REQUIREMENTS

Equipment Control	Location	Operation
Column 1	*Column 2*	*Column 3*
1. Manual clutch or integrated clutch and gear change	Left handlebar	Squeeze to disengage clutch.
2. Foot operated gear change	Left foot control	An upward motion of the operator's toe shift transmission toward lower numerical gear ratios (commonly referred to as "higher gears"), and a downward motion toward higher numerical gear ratios (commonly referred to as "lower gears"). If three or more gears are provided it shall not be possible to shift from the highest gear directly to the lowest gear, or vice versa.
3. Headlamp upper-lower beam control	Left handlebar	Up for upper beam, down for lower beam. If combined with the headlight on-off switch, means shall be provided to prevent inadvertent actuation of the "off" function.
4. Horn	Left handlebar	Push to activate.
5. Turn signal lamps	Handlebars	
6. Ignition		"Off—counterclockwise from other positions."
7. Manual fuel shutoff control		"Off"-control forward, "On"-control downward, "Reserve" (if provided)-control upward.
8. Twist-grip throttle	Right handlebar	Self-closing to idle in a clockwise direction after release of hand.
9. Supplemental engine stop	Right handlebar	
10. Front wheel brake	Right handlebar	Squeeze to engage.
11. Rear wheel brakes	Right foot control[1] Left handlebar permissible for motor-driven cycles.	Depress to engage.

[1]See S5.2.1 for requirements for vehicles with a single control for front and rear brakes, and with a supplemental rear brake control.

[(39 F.R. 32914 — September 12, 1974. Effective: 10/14/74)]

TABLE 2
MOTORCYCLE DISPLAY ILLUMINATION AND OPERATION REQUIREMENTS

Display	Illumination	Operation
Column 1	*Column 2*	*Column 3*
1. Speedometer	Yes	The display is illuminated whenever the headlamp is activated.
2. Neutral indication	Green display lamp	The display lamp illuminates when the gear selector is in neutral position.

TABLE 3
MOTORCYCLE CONTROL AND DISPLAY IDENTIFICATION REQUIREMENTS

Equipment	Control and Display Identification	Identification at Appropriate Position of Control or Display
Column 1	*Column 2*	*Column 3*
1. Ignition	Ignition	Off
2. Supplemental engine stop	Engine stop	Off, run
3. Manual choke	Choke	
4. Electric starter		Start[1]
5. Headlamp upper-lower beam control	Lights	Hi, Lo
6. Horn	Horn	
7. Turn signal	Turn	L,R
8. Speedometer	M.P.H.	M.P.H. increase in a clockwise direction. Major graduations and numerals appear at 10 mph intervals, minor graduations at the 5 mph intervals. (37 F.R. 17474—August 29, 1972. Effective: 9/1/74)
9. Neutral indicator	Neutral	
10. Upper beam indicator	High beam	
11. Tachometer	R.P.M.	
12. Fuel tank shutoff valve	Fuel	Off, on, res.

[1]Required only if electric starter is separate from ignition switch.

37 F.R. 7207
April 12, 1972

Editor's Note:

All references to and language from the *Federal Register* have been reproduced as accurately as possible. Due to some manuscript legibility difficulties, it suggested that any citation from this portion of the report be reconfirmed.

Appendix B
Ohio Rules For Motorized Bicycle Equipment, Testing And Qualifications

Table of Contents

OHIO DEPARTMENT OF HIGHWAY SAFETY
4501-23-01 through 4501-23-33

RULES FOR MOTORIZED BICYCLE EQUIPMENT, TESTING AND QUALIFICATIONS

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4501-23-02	DEFINITIONS
4501-23-03	MANUFACTURER'S REPORT
4501-23-04	MANUFACTURER'S CERTIFICATION
4501-23-05	BRAKES
4501-23-06	TIRES AND WHEEL RIMS
4501-23-07	STEERING
4501-23-08	FUEL SYSTEMS
4501-23-09	EXHAUST SYSTEMS
4501-23-10	SEAT OR SADDLE
4501-23-11	PROHIBITION
4501-23-12	CHAIN AND BELT GUARDS
4501-23-13	VEHICLE STAND
4501-23-14	CONTROLS
4501-23-15	AUDIBLE SIGNALLING DEVICE
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4501-23-17	LIGHTING EQUIPMENT
4501-23-18	HEADLAMP INDICATOR LIGHT
4501-23-19	ASSEMBLY BY PERSON OTHER THAN MANUFACTURER
4501-23-20	PROCEDURE
4501-23-21	PARENTS MUST SIGN
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4501-23-28	EYE TEST
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4501-23-30	DRIVING TEST NOT NECESSARY
4501-23-31	DRIVER EDUCATION NOT NECESSARY
4501-23-32	POSSESSION OF LICENSE
4501-23-33	HANDICAPPED

4501-23-01 Purpose.

These rules are adopted pursuant to Section 4511.521 of the Revised Code for the purpose of establishing standards concerning the equipment of motorized bicycles and the testing and qualifications of persons who do not hold a valid operator's license issued under Chapter 4507. of the Revised Code.

4501-23-02 Definitions.

(A) "Motorized Bicycle" means any vehicle having either two tandem wheels, or one wheel in the front and two wheels in the rear, that is capable of being pedaled and is equipped with a helper motor of not more than fifty cubic centimenters piston displacement which produces no more than one brake horsepower and is capable of propelling the vehicle at a speed of no greater than twenty miles per hour on a level surface.

(B) "Motorized Bicycle License" means the license issued to any person fourteen years of age or older to operate a motorized bicycle whenever the person does not hold a valid operator's license.

(C) "Manufacturer" means any person engaged in the manufacturing or assembling of motorized bicycles or motorized bicycle equipment, including any person importing motorized bicycles or motorized bicycle equipment for sale or resale.

(D) "Person" means every natural person, firm, co-partnership, association, or corporation.

(E) "Motorized Bicycle Equipment" means any system, part, or component of a motorized bicycle as originally manufactured or any similar part or component manufactured or sold for replacement or improvement of such system, part, or component or as an accessory or addition to the motorized bicycle.

(F) "FMVSS" means "Federal Motor Vehicle Safety Standards."

(G) "Moped" means the same as motorized bicycle, and may be used interchangeably with motorized bicycle.

(H) "Motorized Bicycle Operator or Driver" means every person who drives or is in actual physical control of the motorized bicycle.

4501-23-03 Manufacturer's report.

(A) The manufacturer shall provide the department of highway safety with an independent testing laboratory report concerning the vehicle prior to any sales within the State of Ohio.

(B) Based on this independent testing laboratory report, and on any other knowledge which the department may possess concerning the vehicle in question, the department shall approve or disapprove the vehicle for sale in Ohio, as being within or without the definition of a motorized bicycle.

(C) The independent testing laboratory report shall include, as a minimum, specifications and detailed data about the vehicle regarding:

(1) Brake horsepower
(2) Maximum speed
(3) Maximum cubic centimeter piston displacement

4501-23-04 Manufacturer's certification.

The manufacturer shall provide a certification of fact to the department of highway safety that the vehicle is manufactured to comply with the performance and equipment requirements of these rules.

4501-23-05 Brakes.

Every motorized bicycle shall be equipped with a brake system in compliance with "FMVSS 122" (motorcycle brake systems).

4501-23-06 Tires and wheel rims.

Tires shall have an inflated width size of 1.75 inches (4.45 centimeters) minimum and shall have an overall inflated diameter of 19 inches (48.26 centimeters) minimum when mounted to the rim or wheel.

4501-23-07 Steering.

(A) The motorized bicycle steering system shall provide the operator with a means of safely controlling vehicle direction.

(B) Full left and full right turns of the steering system shall not result in interference with any control cables, wiring, or mounted components including the propulsion device.

(C) Handlebars shall not be obstructed in movement between full right and full left turn stops, nor shall any part of the handlebar be more than 15 inches (38.1 centimeters) above that portion of the seat occupied by the rider when the seat is fully depressed.

(D) Handlebars shall be equipped with handgrips designed to insure a firm non-slip grip for the operator's hand.

4501-23-08 Fuel systems.

All motorized bicycle propulsion units using liquid fuel shall have all fuel system components, including the tank, pump, tubing, hoses,

clamps etc., securely fastened so as not to interfere with vehicle operation and shall be designed to prevent leakage when the vehicle is in its normal operating attitude. Fuel lines shall be positioned in a manner to prevent their contact with the engine cylinder head, manifold, exhaust system, or other high temperature surfaces, or moving components. The fuel system shall be adequately vented, and if provided with a fuel shut-off valve, such valve shall be in compliance with "FMVSS 123" (motorcycle controls and displays).

4501-23-09 Exhaust systems.

Motorized bicycles shall be equipped with an exhaust system, where applicable, incorporating a muffler or other mechanical device for the purpose of reducing engine noise. Cutouts and by-passes in the exhaust are prohibited. The system shall be designed to prevent leakage and all components shall be securely attached and located so as not to interfere with the operation of the motorized bicycle. Shielding shall be provided to prevent inadvertent bodily contact with the exhaust system during normal operation.

4501-23-10 Seat or saddle.

A seat or saddle securely attached to the vehicle, shall be provided for the use of the operator. The seat or saddle shall not be less than 25 inches (63.5 centimeters) above a level road surface when measured to the lowest point on top of the seat or saddle cushion with the operator seated in a driving position. The seat or saddle adjustment locking device shall prevent relative movement of the seat from its selected and secure position under all normal vehicle operating conditions. The seat shall be located such that any part of the handlebar is not more than 15 inches (38.1 centimeters) above that portion of the seat occupied by the operator when the seat is fully depressed.

4501-23-11 Prohibition.

No motorized bicycle shall be used to carry more persons at one time than the number for which it is designed and equipped.

4501-23-12 Chain and belt guards.

Any drive chain, drive belt, or rotating component shall be equipped with a guard or covering device sufficient to prevent bodily contact and snagging of clothing.

4501-23-13 Vehicle stand.

All motorized bicycles designed with two wheels shall be equipped with a retracting stand in compliance with "FMVSS 123" (motorcycle controls and displays).

4501-23-14 Controls.

All motorized bicycle operation controls and displays shall be in compliance with "FMVSS 123" (motorcycle controls and displays).

4501-23-15 Audible signalling device.

Every motorized bicycle shall be equipped with at least one audible signalling device capable of giving a signal audible for a distance of at least one hundred feet, activated by pushing a self-returning device located on the left handlebar. Such signalling device shall not consist of a siren or whistle.

4501-23-16 Width.

Motorized bicycles shall have a width no greater than 32 inches (81.28 centimeters).

4501-23-17 Lighting equipment.

All required lighting equipment shall be in compliance with "FMVSS 108" (lamps, reflective devices, and associated equipment - passenger cars, multi-purpose passenger vehicles, trucks, trailers, buses, and motorcycles).

4501-23-18 Headlamp indicator light.

If a multiple beam headlamp is used, a headlamp beam indicator light shall be provided and be in compliance with "FMVSS 123" (motorcycle controls and displays).

4501-23-19 Assembly by person other than manufacturer.

Nothing in these rules and regulations shall prohibit a person other than a manufacturer from constructing, assembling, or equipping a vehicle so as to conform to the specifications of a motorized bicycle. Such person shall, however, comply with all of the rules contained in Chapter 4501-23 of the Administrative Code to the same extent as is necessary of a manufacturer.

4501-23-20 Procedure.

(A) An applicant for a motorized bicycle license shall apply, and be tested in accordance with these rules and regulations, at any Ohio highway patrol examining station.

(B) Upon successful completion of the required tests, the applicant shall take the form provided, indicating such successful completion, to any deputy registrar for the purpose of making application for a motorized bicycle license.

(C) The form provided shall not entitle the holder to any driving privileges, which shall accrue only upon issuance of the motorized bicycle license by the deputy registrar.

4501-23-21 Parents must sign.

Each applicant for a motorized bicycle license who is under eighteen years of age shall have the application for such license signed by one of the applicant's parents, guardian, or other person having custody of the applicant.

4501-23-22 Satisfactory evidence.

Each applicant under eighteen years of age shall present satisfactory evidence of age at the time of applying for the motorized bicycle license.

4501-23-23 Application form.

The application for a motorized bicycle license shall be in the same form and contain the same information as is required on the application for an operator's license issued under Chapter 4507. of the Revised Code.

4501-23-24 Motorized bicycle license.

The motorized bicycle license shall be in the same form and contain the same information as is required on an operator's license issued under Chapter 4507. of the Revised Code, except that there shall be conspicuously imprinted on the front of the motorized bicycle license an indication that said license is valid for use only to operate a motorized bicycle. Such imprint shall read "motorized bicycle," or an abbreviation thereof.

4501-23-25 Prohibited acts.

(A) No person shall display, or cause or permit to be displayed, or possess any motorized bicycle license, knowing the same to be fictitious, cancelled, revoked, suspended or altered.

(B) No person shall lend to a person not entitled thereto, or knowingly permit such other person, to use any motorized bicycle license issued to the person so lending or permitting the use thereof.

4501-23-26 Revocation of license.

(A) Any motorized bicycle license obtained by means of fraud, or in contravention of any of the rules contained in Chapter 4501-23 of the Administrative Code, shall be subject to revocation.

(B) The registrar of motor vehicles may suspend, or cancel any motorized bicycle license upon determination that such license was obtained unlawfully, issued in error, or has been altered or willfully destroyed.

(C) No person shall fail to surrender to the registrar of motor vehicles, upon his demand, any motorized bicycle license which has been suspended, cancelled, or revoked.

4501-23-27 Surrender of license.

A motorized bicycle license shall be surrendered by the holder thereof at the time of issuance of a valid operator's license issued under Chapter 4507. of the Revised Code, or at the time of issuance of any subsequent motorized bicycle license.

4501-23-28 Eye test.

A person applying for a motorized bicycle license shall submit to a vision test at the examining station. Such test shall be identical to the vision test administered to applicants for an operator's license issued under Chapter 4507. of the Revised Code, and shall be subject to the same testing, grading, and retesting requirements as are applicable to operator's license applicants.

4501-23-29 Written test.

A person applying for a motorized bicycle license shall submit to a written test at the examining station. Such test shall be administered in the same manner as the written rules of the road test given to applicants for an operator's license issued under Chapter 4507. of the Revised Code, and shall be subject to the same testing procedure, grading, and retesting procedures as are applicable to operator's license applicants.

Such motorized bicycle test consists of forty questions, twenty of which shall pertain to rules of the road and twenty of which shall pertain to traffic sign identification and recognition. The questions shall be equally weighed, and the applicant must correctly answer seventy-five percent of said questions pertaining to rules of the road and seventy-five percent of said questions pertaining to traffic sign identification and recognition, in order to attain a passing grade.

4501-23-30 Driving test not necessary.

Nothing in these rules shall be construed to require an applicant for a motorized bicycle license to submit to a road test.

4501-23-31 Driver education not necessary.

Nothing in these rules shall be construed to require an applicant for a motorized bicycle license to take or provide proof of having taken, a course in driver education.

4501-23-32 Possession of license.

The motorized bicycle license or operator's license issued under Chapter 4507. of the Revised Code shall be in the immediate possession of the operator of the motorized bicycle while operating such vehicle.

4501-23-33 Handicapped.

An applicant who has indicated on the application for a motorized bicycle test that he or she is suffering from any physical or mental disability that would qualify as a handicap may be permitted to complete the examination for the motorized bicycle test. The test results shall then be forwarded by the examiner to the registrar of motor vehicles, along with an indication of such handicap, and the registrar shall require the necessary medical review and reports as provided in Section 4507.08 of the Revised Code. In no event shall a handicapped applicant for a motorized bicycle license be treated in a different manner than a handicapped applicant for an operator's license issued under Chapter 4507. of the Revised Code.

Appendix C
Current Moped Legislation in Canada*

Mopeds And The Laws In Canada

Prepared by MOPED ASSOCIATION OF CANADA
May 29, 1978

Province	Engine	Power	Max. Speed	Plates Req'd	Defined As	Min. Age	Drivers License	Insurance	Helmet	Passenger	Remarks
British Columbia	50cc or less	not stated	50 km/h 30 mph	yes	motor-cycle	16	any class	yes	yes	no	Insurance combined with license plates
Alberta 1. Power Bicycle up to 75 lbs.	50 cc or less	1 bhp	35 km/h 22 mph	no	power bicycle	12	no	no	yes	operator 16 or over can carry passenger	Unlicensed operator must carry parental consent
2. Moped up to 121 lbs.	50 cc or less	not stated	50 km/h 30 mph	yes	moped	14	learners license	yes	yes		
Saskatchewan	not stated	not stated	not stated	yes	motor cycle	16	motor cycle	yes	yes	yes	Mopeds must comply with all motorcycle standards
Manitoba	50cc or less	not stated	50km/h 30 mph	yes	moped	16	yes any class	yes	not compulsory	can carry infant in spec. seat	Insurance purchased with registration
Ontario	50cc or less	not stated	50km/h 30 mph	yes	motor assist bicycle	16	yes any class	yes	yes	no	
Quebec	50cc or less	2bhp	45km/h 28 mph	yes	moped	14	no	yes	not compulsory	no	Insurance purchased with registration. Operator 14-18 must carry parental consent form.
Nova Scotia	not stated	5bhp	65km/h 40 mph	yes	motor driven cycle	16	motor cycle	yes	yes	no	

continued

*Prepared by Moped Association of Canada, May 29, 1978. Printed in *Moped World*, July 1978, p. 14.

Mopeds And The Laws In Canada
(continued)

Province	Engine	Power	Max. Speed	Plates Req'd	Defined As	Min. Age	Drivers License	Insurance	Helmet	Passenger	Remarks
New Brunswick	50cc or less	not stated	65km/h 40 mph	no	motor driven cycle	14	no	no	not compulsory	no	
Prince Edward Island	50cc or less	not stated	50km/h 30 mph	yes	moped	16	moped operators or drivers license	yes	yes	no	Operator 16-18 needs parental consent form to obtain any license
Newfoundland	not stated	not stated	not stated	yes	motor cycle	16	motor cycle restricted to moped	yes	yes	yes	
Yukon Territory	50 cc or less	not stated	50km/h 30 mph	yes	moped	16	yes class 5	yes	yes	yes	
North West Territories	not stated	not stated	not stated	yes	motor cycle	16	yes	yes	yes	yes	

Appendix D
Course Outline for Moped Safety

Catalog Description:

10 hour non-credit course designed to instruct the student in the mechanical opperation of the vehicle; safety awareness as related to traffic, structured on a totally defensive attitude; general maintenance of the machine. The course will be instructed on Sat. 8:00 AM - 9:00 AM at 28752 Marguerite Pkwy. Mission Viejo Mopeds of Mission Viejo, and 9:00 AM - 10:00 AM on-cycle at Saddleback College parking lot #1. (Saddleback College, February 23, 1977)

Expected Outcomes For Students: (Add your own in nos. 5 and 6.)

The student will be able to:

1. Operate all controls.
2. Pass all state two wheel vehicle knowledge tests.
3. Perform general maintenance as required.
4. Compete with contemporary traffic problems.
5.
6.

Course Content:

1 hour lecture covering maintenance and traffic awareness. 1 hour on-cycle instruction, performing exercises designed to create confidence and a defensive attitude. Included will be complete understanding of California traffic laws as related to MoPed operation.

Methods Of Presentation:

Instructional films and maintenance texts and brochures as provided by the MoPed industry. On-cycle instruction utilizing six Puch MoPeds provided by the manufacturer.

Methods Of Evaluating Student Progress:

Written examination covering state traffic laws and maintenance procedures. On-cycle riding test upon completion of course.

Minimum Student Materials:

Valid California drivers license or instruction permit. All other materials provided to the student.

Saddleback Community College District
Outline For Course Of Study

Saddleback Community College
Mission Viejo, California
Motorized Bicycle Safety Course

2 Hours a Week for 5 Weeks - Total 10 Hours

Course Description

Training received in this course will enable the beginning rider to safely and legally operate a two wheel motorized bicycle on California highways. Additionally he will have gained sufficient knowledge to perform a pre-ride safety inspection of his vehicle, as well as being able to complete many time and money saving maintenance operations.

I. Introduction

1. Objectives of the course
2. Background of the course
3. Instructor background and qualifications

II. Motorized Bicycle

1. Discuss the basic parts
   a. Throttle
   b. Brakes
   c. Pedals
   d. Fuel
   e. Ignition
2. Discuss starting procedure

III. Preparing to Ride

1. Safety clothing
2. Attitude
3. Mounting and dismounting
4. Parking

IV. Riding

1. Walking the motorized bicycle
2. Getting underway
3. Stopping

V. Routine Riding Situations

1. Signaling and using lights
2. Riding at higher speed
3. Riding on different surfaces
4. Carrying passengers and other loads
5. Splitting traffic

VI. Range 1

1. Review all vehicle parts
2. Pre-ride inspection
3. Starting procedure
4. Practice starting
5. Ride long oval pattern
6. Cone weave and "U" turns
7. Square corners
8. Supervised ride

VII. Range 2

1. Ride oval and square corners
2. Obstacle riding
3. Braking
    a. Rear only
    b. Combination braking
4. Practice modified final tests
    a. Slow ride
    b. Decision and turn
    c. "S" curves
5. Supervised ride

VIII. Riding in Traffic

1. Techniques to increase traffic awareness
2. Identifying hazards and special conditions
3. Predicting possible points of conflict
4. Deciding how to avoid conflicts
5. Riding in unusual situations

IX. Maintenance and Insurance

1. Maintaining a safe vehicle
2. Recognizing trouble while riding
3. Insurance
4. Basic maintenance tips

X. Range 3

1. Final written examination
2. Student warm up
3. Discuss final range exercises
4. Final riding examination
5. Issue certificates

Appendix E
Bibliography

Federal Documents

U.S. Department of Transportation, National Highway Traffic Safety Administration. "Mopeds." Compilation of FMVSS standards and other requirements relating to the Moped, mimeograph (n.d.).

U.S. Department of Transportation, National Highway Traffic Safety Administration. "Motorized Bicycle (Moped): Findings of a Survey." April 1976, 9 pp. mimeograph.

U.S. General Services Administration. *Federal Register*, Vol. 39, No. 72—Friday, April 12, 1974, p. 13287.

U.S. General Services Administration. *Federal Register*. Vol. 39, No. 178—Thursday, September 12, 1974, pp. 32914-32915.

U.S. General Services Administration. *Federal Register*. Vol. 40, No. 230—Friday, November 28, 1975.

U.S. General Services Administration. *Federal Register*. Vol. 41, No. 16—Friday, January 23, 1976, pp. 3478-3480.

U.S. General Services Administration. *Federal Register*. Vol. 41, No. 94—Thursday, May 13, 1976, p. 19750.

U.S. General Services Administration. *Federal Register*. Vol. 41, No. 164—Monday, August 23, 1976, pp. 35522-35530.

Vehicle Equipment Safety Commission. "Regulation VESC-17 Minimum Requirements for Construction and Equipment of Mopeds." Washington, D.C.: July 1977, 5 pp.

State Documents

Arkansas, State of. Act 561, Laws 1977, House Bill No. 458, "An Act to Regulate the Operation of Motorized Bicycles; and for Other Purposes." 1977 New Laws, p. 415.

California Department of Transportation (Operations, Office of Engineering). Memo to C.E. Forbes, Chief Engineer, subject: Issues and Policy Recommendations on MOPEDS. 15 June 1978, 9 pp.

California, State of. Assembly Bill No. 1637, Chapter 664. "An Act to Amend Sections 21207.5 and 21209 of the Vehicle Code, Relating to Vehicles." pp. 59-60.

California, Superior Court of the State of, County of Orange. "Moped Policy Statement." 2 pp. mimeograph press release, 23 December 1976.

Colorado, State of. "An Act . . . Concerning Motorized Bicycles." (Senate Bill No. 69). 1977.

Delaware, State of. House Bill No. 10, "An Act to Amend Title 21 of the Delaware Code Relating to the Regulation of Bicycles, Mopeds, and Similar Vehicles." First Session 1977, pp. 1-2.

Florida, State of. House Bill No. 261, Chapter 78-353. "An Act Relating to Mopeds." 1978 New Laws, pp. 1471-1474.

Florida, State of. Title XXII Motor Vehicles, Chapter 316, State Uniform Traffic Control.

Hawaii, State of. Act 175, Laws 1978, Senate Bill No. 782, "An Act Relating to Motor-Bikes." 1978 New Laws, pp. 1133-1164.

Illinois, State of. Public Act 80-262, "An Act to Add Sections 1-148.2, 11-1403.1 and 11-1507.1 . . . . of 'The Illinois Vehicle Code'" Approved 20 August 1977.

Indiana Department of Traffic Safety and Vehicle Inspection. "Indiana Laws Governing Bicyclists and Bicycle Facts." 4 pp. brochure.

Kentucky, State of. House Bill No. 25, "An Act Relating to Motor Vehicles." 1978, pp. 1-42.

Maine, State of. H.P. 174 - L.D. 212, Chapter 402, Public Law, "An Act to Define and Regulate the Operation of Mopeds." 1977, pp. 632-1-3.

Maryland, State of. House Bill No. 309, Chapter 328, "An Act Concerning Vehicle Laws—Mopeds." 1978, 4 pp.

Massachusetts, Commonwealth of. "Motorized Bicycle, Chapter 90, Section I," *Rules and Regulations Relating to Motor Vehicles.*

Michigan Secretary of State. "Motorcycles and Mopeds." 13 pp. booklet [after 1976?].

Michigan, State of. Act 439, Public Acts of 1976, House Bill No. 5202. "An Act to Amend . . . Act No. 300 of the Public Acts of 1949." 1976, 12 pp.

Michigan, State of. Act 54, Public Acts of 1977, House Bill No. 4362, "An Act to Amend Sections 3101 and 3103 of Act No. 218 of the Public Acts of 1956 . . ." 1977, 2 pp.

Mississippi, State of, Governor's Highway Safety Program. "Mississippi Motorcycle Operator's Handbook." Booklet, 36 pp. (n.d.).

Missouri, State of. House Bill No. 79, "An Act Relating to Bicycle Equipment, Lighting Reflectorization and Operation with a Penalty Provision and an Effective Date." (Effective 1 January 1978), pp. 1-3.

New Hampshire, State of, Department of Highway Safety, Division of Motor Vehicles. "Synopsis of Laws Pertaining to Mopeds." 6 pp. brochure (n.d.).

New Jersey Division of Motor Vehicles. "Motorized Bicycle (Moped) Operator's Handbook." 14 pp. booklet (n.d.).

New Jersey Division of Motor Vehicles, Office of Highway Safety. "Motorized Bicycling . . . Made Safe and Sensible: A Manual for Gasoline- and Electrically-Powered Bicycles." Booklet, 25 pp. (n.d.).

New Jersey, State of. Assembly No. 2192. "An Act to Amend and Supplement P.L. 1975, c.250 and R.S. 39:1-1." (Introduced 5 August 1976) pp. 1-10.

New York State Department of Motor Vehicles, Office of Public Relations. "For Immediate Release." Two News Releases dated 3 September 1977 (1 and 5 pp. resp.).

North Carolina, State of. Article 4A. "Bicycle and Bikeway Act of 1974."

North Carolina, State of. "Certain Bicycles with Motors Exempt," *Motor Vehicle Laws of North Carolina*, Sec. 20-50.1, pp. 83-85.

Ohio Department of Highway Safety, "Moped Safety Tips." Brochure, 4 pp. (n.d.).

Ohio Department of Highway Safety. "Motorized Bicycles." *Ohio Driver's Handbook*, March 1978, pp. 73-78.

Ohio Department of Highway Safety. "Motorized Bicycles Approved by State of Ohio." 1 p. mimeograph, 10 February 1978.

Ohio Department of Highway Safety. "Ohio Motorcycle Operators' Manual: Supplement to the Ohio Driver Handbook." Booklet, 37 pp. (n.d.).

Ohio Department of Highway Safety. "Ohio's New 'Moped' Law." 8 pp. brochure, (n.d.).

Ohio, State of. "An Act to Amend . . . and to Enact Sections . . . of the Revised Code to Create a Separate Classification for Motorized Bicycles . . ." (Amended Subst. Senate Bill No. 100, 112th General Assembly, Regular Session, 1977-78.)

Oregon Department of Transportation, Public Information Office. Motor Vehicles Division. "Mopeds/Motor Bicycles in Oregon." 2 pp. mimeograph, October 1977.

South Carolina, State of. Act No. 156, Acts of 1977, "An Act . . . Relating to the Definition of a Bicycle . . ."

South Dakota, State of. Senate Bill No. 180, "An Act to Define and Regulate the Use of a Moped." 1978 New Laws, pp. 221-224.

Texas, State of. Texas Laws Relating to Uniform Act, "V.C.S. 67 Old.—Uniform Act of Regulating Traffic on Highway." pp. 150-151, 294-297.

Vermont Agency of Transportation, Department of Motor Vehicles. "Vermont Periodic Inspection Manual: Mo-Ped, Motorcycle," 1 May 1977, 27 pp.

Vermont, State of. House Bill 113, Approved 25 March 1977, 3 pp.

Vermont Agency of Transportation, Department of Motor Vehicles. "Vermont Periodic

Wisconsin, State of. 1977 Assembly Bill 713, "An Act . . . Relating to Defining and Regulating Mopeds . . . " Chap. 288, Laws of 1977.

Other Sources

American Bicyclist & Motorcyclist. Approve Motorized Bikes in Mass., N.Y.; 'Moped-State' Talley Now 23." September 1976.

Balcerak, John C.; Pancione, Kathleen L.; and States, John D. "Injury Characteristics of Riders of Motorcycles, Minibikes, and Mopeds." *American Association for Automotive Medicine, Proceedings of the 21st Conference,* Vancouver, 15-17 September 1977.

Barry, Patricia Z. "The Role of Inexperience in Motorcycle Crashes." *Journal of Safety Research,* Vol. 2, No. 4, pp. 229-239.

Bicycle Dealer Showcase. "Dealer Survey '78." February 1978, pp. 33-38.

_____."Financial Responsibility in California . . . An Official Clarification." April 1977, p. 54.

_____. "International Moped & Bicycle Exposition: Expo Review." March 1977, pp. 26-34.

_____. "MBA Becomes MAA at New York Meeting." May 1978, p. 76.

_____. "Moped Law Passes in Ohio." January 1978, p. 92.

_____. "New Moped Law for South Dakota." April 1978, p. 72.

_____. "Preview: the International Moped & Bicycle Exposition." November 1976, p. 25.

_____. "Recap: BDS Expo Seminars." March 1978, p. 44.

_____. "There's Profit in the Moped Aftermarket." March 1977, pp. 36-37.

_____. "Vehicle Equipment Safety Commission Announces Moped Requirement Hearing." March 1977, p. 54.

Bicycle Journal. "Government Study Says 3 Million Mopeds Can Be Buzzing the U.S. by 1980." July 1977, p. 24.

_____. "Moped Imports Really Climbed Last Year, U.S. Commerce Dept. Says." June 1978, p. 60.

Bishop, Gordon L. "Saving the Environment: The Moped Is a Change in the Right Direction." *Moped Magazine*, March/April, 1977, p. 7-8.

Boom in Bikeways. "Five States Prohibit Mopeds on Bike Paths." December 77/January 78, p. 8.

Brass, Edward A. "Homelite's R&D Head Reports on Firm's Progress: Transmissions Highlighted." Moped Magazine, November/December 1977, pp. 16-20.

Buchanan, Lewis S. "Moped Safety: Program Development and Research by the National Highway Traffic Safety Administration." 7 pp. mimeograph (n.d.).

_____. "Mopeds: a Calculated Risk." *National Traffic Safety Newsletter*, September 1977, pp. 8-11.

_____. "The Motorcycle-Bicycle Safety Analogy." *Journal of Traffic Safety Education*, October 1973, pp. 9-10.

_____. Telephone Conversation with writer, 28 June 1978.

_____; Biscoff, Donald C.; and Richardson, Henri A. "A Preliminary Analysis of Safety Helmet Effectiveness." Paper #73013, I, Part I, pp. 1-13. Second International Congress on Automotive Safety, Motorcycle and Recreational Vehicle Safety, San Francisco, Calif., 16, 18 July 1973.

Business Week. "An Onrush of Mopeds: 150 Mi. to the Gal." 20 June 1977, p. 33.

Carney, Leo. "Leaders Take a Look at 1978." *Moped Magazine*, January/February, 1978, pp. 10, 29.

_____. "New Factors Brighten an Already Prosperous Market Picture." *Moped Magazine*, Summer 1977, pp. 6-7.

_____. "Planning for Tomorrow: Future Uses for Today's New Transportation." *Moped Magazine*, March/April 1977, pp. 17-18.

_____. "Yeah, But Will They Buy These Things?" *Moped Magazine*, November/December 1977, pp. 4-5.

Carraro, Barbara. "A Look at Motorcycle Accidents in 1975." *Traffic Safety*, November 1976, pp. 16-39.

_____. "A Look at Motorcycle Accidents in 1976." *Traffic Safety*, January 1978, pp. 8-11.

Changing Times, the Kiplinger Magazine. "Motorized Bikes—They Get Up to 200 mpg." January 1970, pp. 21-23.

Clapp, Wallace L. "Specialty Insurer Introduces Policy Designed Exclusively for Mopeds." *Rough Notes*, October 1977, p. 14.

Cleary, William. Presentation given as part of "Mopeds: Transportation Solution or Problem?" session of the Fourth Annual North Carolina Conference on Highway Safety. Raleigh, 9 November 1977.

Columbus Dispatch. "Hearing on Mopeds Scheduled." 6 November 1977.

Consumer Union. "Mopeds." (Subtitle on cover: "They Offer an Efficient Way to Get Around Town. But Are They Safe?") *Consumer Report,* June 1978, pp. 319-326.

Consumers Association. "Two Wheels in Cities: Bicycles, Mopeds, Motorbikes." *Which?,* London, April 1974, pp. 41-71.

Cox, Rich. "Buyer's Guide: A Passel of Econobikes for Strokin' and Pokin'." *Motorcyclist,* June 1976, pp. 74-76.

Davis, Art and Kearney, Edward F. "State Laws on Mopeds and Motorized Bicycles." (A Traffic Laws Commentary by the National Committee on Uniform Traffic Laws and Ordinances for the U.S. Department of Transportation) Washington, D.C., January 1978.

Dunn, Tom. Presentation given as part of "Mopeds: Transportation Solution or Problem?" session of Fourth Annual North Carolina Conference on Highway Safety. Raleigh, 9 November 1977.

Dupre, Paul. *Mopeds.* Matteson, Illinois: Greatlakes Living Press, 1977.

Estefan, Steven. Presentation given as part of "Mopeds: Transportation Solution or Problem?" session of Fourth Annual North Carolina Conference on Highway Safety. Raleigh, 9 November 1977.

European Conference of Ministers of Transport, Council of Ministers. Report by the Committee on Deputies, "Road Safety Problems Concerning Two-Wheeled Vehicles in the Member Countries of the E.C.H.T. in 1971." Paris, France, 6 June 1974 (reprint).

Evans, Michael L. "How Safe Are Mopeds?" *Journal of Traffic Safety Education,* October 1977, p. 6.

_____. "Improving the Moped's Status and Safety." *Journal of Traffic Safety Education,* April 1978, pp. 10, 30.

_____. *A Safety Analysis of the Moped.* Master's thesis, California State University, 1977.

_____. "A Safety Analysis of the Moped." *Moped World.* "Part 1," August 1977, pp. 6, 19; "Part 2," September 1977, pp. 8-9; "Part 3," November 1977, pp. 4-6; and "Part 4," December 1977, pp. 11-19.

F.C. & S. Bulletins. "Questions and Answers: Homeowners and the Horse." November 1976, pp. 275-276.

Hartford, Bill. "How to Stay Alive on a Motorized Bicycle." *Popular Mechanics*, December 1975.

_____. "Mopeds: Pedal Home If You Run Out of Gas!" *Popular Mechanics*, August 1976, pp. 57-58.

Hemion, Judy. "Are Your Riders Ready for a Rugged Winter?" *Moped Magazine*, November/December 1977, pp. 27, 34.

Hight, P.V.; Siegel, A.W.; and Nahum, A.M. "Injury Mechanism in Motor-cycle Collisions." Proceedings of 17th Conference of the American Association of Automotive Medicine.

Highway Users Federation. "Handy Little Mopeds Spark Variety of Laws, Regulations." *Reporter*, June 1978, p. 4.

Hoyt, W. "How to Get 200 Miles to the Gallon." *Family Circle*, Vol. 88 (1976), p. 30.

Huelke, Donald F., ed. *American Association for Automotive Medicine, Proceedings of the 21st Conference*. Vancouver, 15-17 September 1977.

Institute for Road Safety Research. *Crash Helmets for Moped Riders*. 1975.

Insurance Institute for Highway Safety. "Government Considering Moped Use Standard." *Status Report*, 24 November 1975, pp. 1-4.

_____. "Hearing on Moped Regulations Scheduled." *Status Report*, 15 March 1977, pp. 7-8.

_____. "Mopeds: Subject Area and Docket." *Status Report*, 17 May 1977, p. 19.

_____. "Standards Set for Bicycles—Proposed for Cyclists." *Status Report*, 18 February 1976, pp. 8-9.

_____. "Update . . . Closing Date for Moped Docket." *Status Report*, 7 June 1976, pp. 8-9.

_____. "Update . . . Mopeds." *Status Report*, 31 May 1977, p. 4.

_____. "Update . . . NHTSA Opens Moped Docket." *Status Report*, 10 December 1975, p. 7.

The Insurance Journal. "Moped? Moped? What's a Moped?" (n.d.), p. 14.

Journal of American Insurance. "What's a Moped?" Winter 1976, 77, pp. 28-30.

Journal of Traffic Safety Education. "Moped Insurance." April 1978, p. 37.

Kearney, Edward F. Memo to Governors' Highway Safety Representatives, Legislative Reference Bureaus. 14 August 1975, 2 pp.

_____. Presentation given as part of "Mopeds: Transportation Solution or Problem?" session of Fourth Annual North Carolina Conference on Highway Safety. Raleigh, 9 November 1977.

Knezek, Bobbi. "New York's Moped School." *Moped Magazine*, Summer 1977, p. 18.

Korkea-Aho, M. "Use of Safety Helmets and Goggles by Motor Cycle and Moped Riders in Finland in 1973." *Report No. 16*, Central Organization for Traffic Safety, Finland, 1975, pp.23-38.

Kritz, L.B.; Mohlin, H.; and Olsson, B. "Accidents Involving Cyclists and Moped Drivers: Part II, Moped Drivers." *Report No. 174*, Swedish Council on Road Safety Research, June 1971.

Krystiniak, Frank. "Moped Safety." *Proceedings of 1977 National Safety Congress*, Vol. 24, pp. 48-51.

Lagerroos, Linda. "Some Safety Tips for Moped Travel." *Progress Report* (Albany, New York: New York State Interdepartmental Traffic Safety Committee) January 1978, pp. 3-4.

Langway, Lynn. "The Moped Moment." *Newsweek*, 23 May 1977.

Langwieder, Klaus. "Collision Characteristics and Injuries to Motorcyclists and Moped Drivers." Conference Paper at Twenty-First Stapp Car Crash Conference, New Orleans, 19-21 October 1977.

Latimer, Bob. "Motorized Bikes: New Profit Potential." *Bicycle Dealer Showcase*, October 1975, pp. 22-25.

Licht, Kenneth F. "The Moped and the Traffic Mix." *Traffic Safety*, July 1978, pp. 8-9, 28-29.

_____. "Moped Safety in the Next Decade." Presentation to National Conference of Governor's Highway Safety Representatives. Dearborn, Michigan, 10-13 October 1977 (working copy, 9 pp.).

_____. "Moped? What's a Moped?" *Family Safety*, Spring 1977, pp. 24-25.

_____. "The Mopeds Are Coming." *Traffic Safety*, April 1977. Reprinted in *Journal of Traffic Safety Education*, July 1977, pp. 7-8, and in *Circle K Magazine*, September/October 1977, pp. 6-7.

Little, Guy. "Oil: Proper Mix Is a Must." *Moped Magazine*, Summer 1977, p. 8.

Lummis, Michael and McSwain, Norman E. Jr. "Impact of Motorcycle Helmet Law Repeal." American Association for Automotive Medicine, Proceedings of the 21st Conference, Vancouver, 15-17 September 1977.

Mackerodt, Fred. "The Mo-Ped's Curious Debut." *Mechanix Illustrated*, May 1976.

Minnesota Driver & Traffic Safety Education Association. "A Goal in Mind: To Save Lives on Our Highways." *Newsletter*, September 1977.

Money. "Mopedocracy." July 1977, p. 26.

Moped Magazine. "California Mopeds Allowed on Bike Paths." Summer 1977.

_____. "Industry Is Tackling the Insurance Question." January 1978, p. 34.

_____. "Insurance Agent Aids Dealers." January 1978, p. 16.

_____. "Insurance Survey Is Being Conducted." January/February 1978, p. 30.

_____. "MBA's Zimmerman Looks Toward 1978: Sees More Americans in Market; Takes Issue with Insurance." November/December 1977, pp. 6, 9.

_____. "Moped Made Legal in Washington." January/February 1978, p. 30.

_____. "New Jersey's New Law Detailed." November/December 1977, p. 22.

_____. "Puch's Kavner Addresses National Safety Council; Government Responds: 'No Unrealistic Restraints.'" November/December 1977, p. 18.

_____. "Selling America Something She Finally Needed: The Recent History of the Moped in the U.S." Summer 1977, p. 34.

_____. "What Every Dealer Should Know About Advertising." January/February 1978, pp. 8, 22.

_____. "Who's Who in the Industry for 1977." Summer 1977, p. 31.

Moped Owners Association. "Safety Program." 12 pp. brochure (n.d.).

Moped World. "California Laws Applicable to Mopeds." May 1978, p. 10.

_____. "Dated, But Interesting Figures." February 1978, p. 16.

_____. "Getting More Out of Your Moped." January 1978, pp. 12-20.

_____. "Lung Association Applauds 'Low Pollution' of Mopeds." April 1978, p. 18.

_____. "Moped Liability Insurance." April 1978, p. 9.

_____. "Moped Research Projects Move Slowly." June/July 1977, p. 8. Reprinted from Moped Owners Association materials.

_____. "Moped Safety." June-July 1977, p. 16.

_____. "Moped World Talks with Serge Seguin of Motobecane." March 1978, pp. 4-7.

_____. "New Moped Popularity Brings Safety Council Report." February 1978, p. 14.

_____. "Safety Helmets for Mopeds." April 1978, p. 12.

_____. "Utility of the Motorized Bicycle." June/July 1977, p. 12.

_____. "West Virginia Moped Bill." April 1978, p. 20.

Motorcycle Industry Council. "Motordriven Cycle-Motorized Bicycle-Moped." *Regulatory Alert!* RA 75-045, 5 December 1975.

_____. "Motorized Bicycles." *Regulatory Alert!* RA 76-026, 21 May 1976.

_____. "Motorized Bicycles, Safety Aspects," Reprint of Docket 75-29, NHTSA, RA 75-045, M.I.C., Washington, D.C., 5 December 1975, unpaged mimeograph.

_____. "A situation Review of the Moped Market." Research Report, RR 75-039, Newport Beach, Calif., November 1975, mimeographed.

_____. "State Law Review on Motor-Driven Cycle/Motorized Bicycle/Moped Requirements (Interim Publication, Oct. 1, 1975)." *Government Relations Bulletin.* series, GR 75-063, 24 Oct. 1975, 6 pp.

_____. *State Legislative Report.* File Subject: Mopeds, File Numbers SLI 76-001 through SLI 76-009; SLI 77-001 through SLI 77-003; and SLI 78-001 through 78-008. Mimeographs, consecutive dates throughout each year.

_____. "Summary of State Laws Governing Mopeds January 1, 1978." *Government Relations Bulletin,* GR 78-002, 6 January 1978, 17 pp.

_____. "Vehicle Equipment Safety Commission, 'VESC Proposed Moped Regulations.'" Second draft, GR. 76-017, Newport Beach, Calif., 24 June 1976, mimeograph.

Motorized Bicycle Association. "Current Motorized Bicycle Legislation." *MBA News,* 1 p. mimeograph, 22 August 1977.

_____. "Fact Sheet on Motorized Bicycles." *MBA News,* 1 p. mimeograph (n.d.).

_____. "For Immediate Release." MBA News, 2 pp. mimeograph, 25 October 1977.

_____. "Functions of the Motorized Bicycle Association." *MBA News,* 1 p. mimeograph (n.d.).

_____. "Manufacturer, Importer and Distributor Members." *MBA News,* 1 p. mimeograph (n.d.).

_____. "The Motorized Bicycle." *MBA News,* 6 pp. mimeograph (n.d.).

_____. "Motorized Bicycle Association Executive Director Reviews 1977 Moped Legislation." *MBA News,* 2 pp. mimeograph, 7 October 1977.

_____. "Motorized Bicycle: Safe Transportation." *MBA News,* 1 p. mimeograph (n.d.).

_____. "Motorized Bicycles Save Energy and Money." *MBA News*, 2 pp. mimeograph (n.d.).

_____. "Short-Haul Driving Is Long on Economy." *MBA News*, 2 pp. mimeograph (n.d.).

_____. "A State by State Breakdown of Moped Laws." *Moped Magazine*, November/December 1977, pp. 32-33.

National Safety Council. "Safety Education Data Sheet No. 101: Mopeds." 4 pp. leaflet (n.d.).

Ohio Department of Highway Safety. "GTSC Regional Conferences to Feature Moped/Pedestrian Safety." *Ohio Traffic Record*, Vol. 3, March 1978, p. 1.

_____. "Legislation to Clarify Being Introduced; Moped/Motorcycle Specifications Confuse Operators." *Ohio Traffic Record*, Vol. 2, No. 3, March 1977, p. 1.

_____. "Moped Law Becomes Effective April 1." *Ohio Traffic Record*, Vol. 3, January 1978, pp. 1-2.

Ohio, Governor's Traffic Safety Committee. Regional Spring Conference, Proceedings (Mopeds and Pedestrians). Columbus, 3 May 1978.

Ohio Traffic Safety Education Center. "Moped Law, Rules Go into Effect April 1." *OTSEC NewsLine*, Vol. 2, No. 2 (1978), pp. 3, 6.

_____. "Mopeds: Which Cycle Is It?" *OTSEC NewsLine*, Vol. 1, No. 2 (1976), pp. 2-3.

O'Mara, John J. "Contributory Factors in Motorcycle Casualty Accidents." Paper #73003, I, Part I, pp. 1-21. Second International Congress on Automotive Safety, Motorcycle and Recreational Vehicle Safety, San Francisco, Calif., 16-18 July 1973.

Pollitz, Ed. "Motorized Bicycles: Easy Peddling." *Bicycle Dealer Showcase*, February 1976, pp. 28-31.

Pratt, Terry. "Mopeds for the Bicycle Dealer: Pros, Cons, & Profits." *Bicycle Dealer Showcase*, Dec. 1976, pp. 24-27.

Reinders, Hank. "Back to School Merchandising: Fun Company Mopeds' Plan to Rack-up the Profits." *Bicycle Dealer Showcase*, August 1977, pp. 31-32.

_____. "Moped Flooring and Financing." *Bicycle Dealer Showcase*, September 1976, p. 44.

Salster, Michael. "Moped' Drivers Crackdown Set." *Columbus Dispatch*, 28 September 1976.

Schiavo, Tony. "Will Your Bike Purrrrrrrr After Winter's Burrrrrrrr?" *Moped Magazine*, March/April 1977, pp. 12-13.

Schwartz, Sid. "Moped Services." Presentation given at the International Moped and Bicycle Exposition, Anaheim, Calif., 14 January 1977.

Scott, Basil Y. "Moped Legislation: The New York Approach." *Traffic Safety*, March 1978, pp. 8, 9, 28.

_____. "Moped Operation in New York State." *1977 National Safety Congress Proceedings*, Vol. 24, Traffic and Driver Improvement, pp. 52-55.

Seguin, Serge D. "Dealer Checklist: Your Lines Must Meet Federal Standards." *American Bicyclist and Motorcyclist*, March 1976, pp. 85-86.

_____. "Moped Sales." Presentation given at the International Moped and Bicycle Exposition, Anaheim, Calif., 14 January 1977.

_____. "This Is the Motorized Bike: Tiger vs. Pussycat." *Moped Magazine*, March/April 1977, p. 16.

Severy, B.M.; Brink, H.M.; and Blaisdell, D.M. "Motorcycle Collision Experiments." 14th Stapp Car Crash Conference, Ann Arbor, 1970, paper 700897.

Sheriff, Orange County, California. "Special Bulletin: Motorized Bicycles." 5 pp. mimeograph (n.d.).

Shevelew, Jonathon A. "Albany Still Confused . . . and Confusing." *Moped Magazine*, March/April 1977, p. 11.

Suzuki, T.; Ochiai, H.; Ishikawa, K; and Hakariya, A. "Characteristics of All 2-Wheeled Vehicle Accidents (Bicycles, Mopeds and Motorcycles) in the Tokyo Metropolis." *3rd International Congress on Automotive Safety Proceedings*, Washington, D.C., 1974.

Thomas, Wayne. "We Road Test a New Mo-Ped." *Mechanix Illustrated*, November 1976.

Thompson, W. Craig. "Motorized Bicycles: an Overview." *Bicycle Dealer Showcase*, July 1976, pp. 20-21.

Time. "Moped Madness." 4 July 1977, p. 66.

Ulrich, Richard. "Mopeds—Ready or Not, Here They Come!" Presentation to AAMVA Ninth Annual Institute on Motor Vehicle and Traffic Laws, Boulder, Col., 14-17 August 1977.

University of North Carolina Highway Safety Research Center. "Mopeds: Center to Study U.S. Accidents." *Highway Safety Highlights*, March 1978, pp. 1-4.

U.S. News & World Report. "Make Motorcyclists Wear Helmets? (Interviews with Ben Kelley and Gene Wirwahn)." 18 July 1977, pp. 39-40.

Van Cott, Richard. "Moped Safety." Presentation given at the International Moped and Bicycle Exposition, Anaheim, Calif., 14 January 1977.

Varga, Lou. "Demonstration in N.J.: Moped People Help Defeat Bill." *Moped Magazine*, Summer 1977, pp. 32-33.

Waller, Patricia F. "The Impact of a Motorcycle Lights-On Law." American Association for Automotive Medicine, Proceedings of the 21st Conference, Vancouver, 15-17 September 1977.

Western Insurance Information Service. "The Nature of Mopeds: Insurance, Legal Requirements, and Safety." *WIIS News*, January 1978, pp. 3-4.

Wetenkamp, Herb. "Moped Safety: Good Business, Good Sense." *Bicycle Dealer Showcase*, January 1978, pp. 68-70.

_____. "Mopeds: Get after That Aftermarket." *Bicycle Dealer Showcase*, March 1978, pp. 46-48.

WNET. "The MacNeil/Lehrer Report: Mopeds." Transcript of Show #3014, 11 pp., 21 July 1977.

Worley, Jeanette A. "An Investigation of the Use of Motorized Bicycles on Public Highways." Paper prepared for Traffic Safety Department, Miami University, Oxford, Ohio, 1977, 11 pp.

Zimmerman, Paul. Presentation given as part of "Mopeds: Transportation Solution or Problem?" session of Fourth Annual North Carolina Conference on Highway Safety. Raleigh, 9 November 1977.

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